Equity Valuation
Carlsberg A/S

Karina Theresia Arnold

Dissertation written under the supervision of
Professor José Carlos Tudela Martins

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Carlsberg A/S

Downside risks after share buy-back

In course of the new strategy Carlsberg also announced a share buy-back program of DKK 4.5bn, which boosts the earnings per share. Further, Carlsberg increased its dividends by 100% since 2014 and reduced its costs. However, to sustain this performance additional investments are required and also macroeconomic conditions remain difficult in the main markets. The DCF valuation resulted in a target price of DKK 826.51, with an upside potential of 4%, reflecting the challenges in the next years. Thus, a hold recommendation is given.

Successful transformation strategy and greatly improved growth

Since the launch of the new strategy in 2016, Carlsberg strengthened its brand performance, optimised efficiency and improved its operational performance. This is also reflected in the strong financial results in 2018. Improvements in the EBITDA and net profit were mainly driven by cost savings and increased sales in Asia. Revenues increased by 2.9% from 2017 to 2018. Further, the cash flows of Carlsberg were driven by lower depreciations and working capital as in the last three years Carlsberg reduced its cash conversion cycle by extending the days payables outstanding.

Focus on premiumisation and expanding in emerging markets

In recent years Carlsberg focused on premiumisation, driving growth and leader positions in emerging markets. The achieved revenue growth was boosted by sales in the Asian market. The beer market in Europe is highly saturated. In addition, government regulations and shifts in consumer behaviours towards healthy lifestyles make it difficult for Carlsberg to gain further market share in the near future. Carlsberg's focus on fast-growing and high-end segments, especially in the Asian market offer new opportunities that are mainly driven by premiumisation and the focus on craft, speciality and low-and non-alcoholic beverages.

Key Financial Data

in DKK Million	2016	2017	2018	2019E	2020E	2021E
Sales	62,614	60,655	62,503	64,341	66,279	68,082
EBITDA	13,006	13,583	13,420	13,600	14,046	14,801
margin%	20.8%	22.4%	21.5%	21.1%	21.2%	21.7%
EBIT	8,245	8,876	9,329	9,197	9,510	10,142
margin%	13.2%	14.6%	14.9%	14.3%	14.3%	14.9%
Net Profit	4,486	1,259	5,309	5,750	5,582	5,989
margin%	7.2%	2.1%	8.5%	8.9%	8.4%	8.8%
EPS (DKK)	29.4	8.3	34.8	37.7	36.6	39.3
ROE	8.4%	2.8%	11.1%	12.5%	12.1%	12.7%
Sales Growth	-4.2%	-3.1%	3.0%	2.9%	3.0%	2.7%
EV/EBITDA (x)	11.3	10.8	11.0	10.8	10.5	9.9
EV/EBIT (x)	17.8	16.6	15.8	16.0	15.5	14.5
Debt/Equity	56.3%	48.8%	50.1%	57.5%	62.0%	62.0%
NIBD/EBITDA	2.05	1.53	1.37	1.83	1.91	1.88

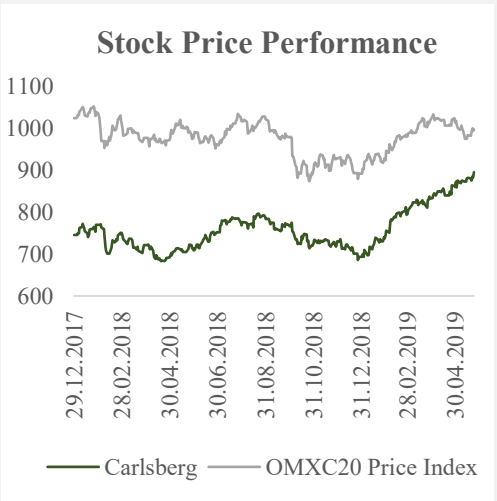
S H B

Sell **Hold** Buy

Close date	28.02.2019
Share price (DKK)	**794.6**
Target Price	826.5
Upside	4.0%
Market Cap (DKKm)	104,899
Enterprise Value (DKKm)	147,074
52 Week High (DKK)	894.8
52 Week Low (DKK)	682.8
Reuters	CARLb.CO
Bloomberg	CARLB.DC

WACC Computation

Risk-free rate	0.236%
Beta	0.84
ERP	8.84%
Cost of Equity	7.68%
Cost of Debt	1.62%
Tax rate	27%
E/V	81.39%
D/V	18.61%
WACC	**6.47%**



Valuation Estimates: DCF Valuation

In order to obtain the target share price of Carlsberg the WACC-based DCF approach was selected. The DCF methodology is based on assumptions and forecasts reflecting the expected future market developments. The appropriate WACC for discounting the FCFF and the Terminal Value amounts to 6.47%. After the explicit period a perpetual growth rate of 1.2% is assumed.

FCFF	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
EBIT	9,197	9,510	10,142	10,422	10,664	11,201	11,504	11,736	11,953	12,139
- Taxes on EBIT	2,483	2,568	2,738	2,814	2,879	3,024	3,106	3,169	3,227	3,277
NOPLAT	6,714	6,942	7,403	7,608	7,785	8,177	8,398	8,567	8,726	8,861
+ Depreciation	3,788	3,902	4,008	4,110	4,198	4,289	4,376	4,458	4,535	4,607
+ Amortisation	550	567	582	597	610	623	636	648	659	669
- Impairment PPE and IA	65	67	69	71	72	74	75	77	78	79
- Δ Operating WC	478	-442	-411	-402	-349	-361	-407	-351	-329	-306
- Capital Expenditures	4,517	4,653	4,779	4,901	5,005	5,115	5,218	5,316	5,408	5,494
FCFF	5,991	7,133	7,556	7,745	7,864	8,261	8,523	8,631	8,763	8,870
PV FCFF	5,627	6,293	6,261	6,027	5,748	5,671	5,495	5,227	4,984	4,739
Total PV FCFF										56,072
Perpetual growth rate										1.20%
Terminal Value										170,340
PV Terminal Value										91,002
Total Enterprise Value										**147,074**
- net Debt										18,394
- Non-Controlling Interests										2,587
Equity Value										**126,093**
Shares Outstanding										152.56
Value per Share (DKK)										**826.51**

Relative Valuation

To verify the results obtained through the DCF valuation, a relative valuation using forward multiples was performed. The peer group contains the following five comparable companies: AB InBev, Heineken N.V., Molson Coors Brewing Company and Asahi Group Holdings Ltd. The obtained target prices are slightly different from the DCF valuation results.

Relative Valuation	EV/EBITDA	EV/EBIT	EV/Sales	PER	P/Sales
Multiple (harmonic mean)	10.5	14.5	2.3	15.4	1.5
Enterprise Value	141,231.40	135,080.88	146,814.21	81,516.47	95,488.60
Share Price	**788.22**	**747.90**	**824.81**	**534.32**	**625.91**

Abstract

In this dissertation, the share price of Carlsberg A/S, as of 28th February 2019, was examined to identify whether it is under- or overvalued or properly priced. First, the different valuation models were investigated, concluding that a WACC-based DCF valuation is the most suitable approach to obtain the fair value of Carlsberg. Supplementary, a relative valuation was performed to verify the DCF results. It was found that through the implementation of a new strategy, Carlsberg is able to adapt to challenges in the industry and to preserve its market position. The main valuation methodology returned a target price of DKK 826.5. The similarity to the market price of DKK 794.6 at the valuation date resulted in a hold recommendation for Carlsberg's stock. To assess the effect of the key valuation input such as WACC and the perpetuity growth rate on the share price, the performed sensitivity showed that even small changes cause significant changes in the share price. Lastly, the valuation results were compared with the equity research report of ODDO BHF. Despite different assumptions and valuation parameters the target prices are fairly similar.

Title: Equity Valuation – Carlsberg A/S

Author: Karina Theresia Arnold

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Resumo

Nesta dissertação, o preço das ações da Carlsberg A/S, à data de 28 de fevereiro de 2019, foi examinado para identificar se este está sub- ou sobreavaliado ou se tem um preço adequado. Em primeiro lugar, foram investigados os diferentes modelos de avaliação, tendo-se concluído que uma avaliação DCF baseada no WACC é a abordagem mais adequada para obter o valor justo da Carlsberg. Complementarmente, foi realizada uma avaliação relativa para verificar os resultados do DCF. Verificou-se que, através da aplicação de uma nova estratégia, a Carlsberg é capaz de se adaptar aos desafios do setor e de preservar a sua posição no mercado. A principal metodologia de avaliação revelou um preço-objetivo de DKK 826,5. A semelhança com o preço de mercado de DKK 794,6 na data da avaliação resultou numa recomendação de detenção das ações da Carlsberg. Para avaliar o efeito do fator-chave de avaliação como o WACC e a taxa de crescimento da perpetuidade sobre o preço das ações, a análise de sensibilidade realizada mostrou que mesmo pequenas alterações provocam alterações significativas no preço das ações. Por fim, os resultados da avaliação foram comparados com o relatório de equity research da ODDO BHF. Apesar dos diferentes pressupostos e parâmetros de avaliação, os preços-alvo são bastante semelhantes.

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Autor: Karina Theresia Arnold

Palavras-chave: Indústria da cerveja, Indústria das bebidas, Relatório de Pesquisa, Avaliação de Empresas, Carlsberg A/S

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1 Introduction

The purpose of this dissertation is to determine the fair value of Carlsberg's stock as of 28th February 2019. The analysis performed in the next chapters aims at identifying if the current share price of Carlsberg is under- or overvalued or properly priced. Based on the performed valuation an investment recommendation is given related to the difference between the intrinsic valuation and the current share price.

The dissertation is divided into five parts. First, a literature review is conducted, illustrating the state-of-art of the current valuation literature. Different approaches are presented and evaluated regarding the suitability for the valuation of Carlsberg. Next, a detailed strategic analysis is performed capturing the beer industry including the competitive forces that Carlsberg faces. Further, the past financial performance is investigated in order to assess the future prospects of the company.

Chapter four, explains the estimates and assumptions on which the intrinsic WACC-based DCF approach is based. A sensitivity analysis is conducted to consider the effects of changes in key parameters on the target price. Further, this section contains a relative valuation to verify the results of the DCF methodology. Finally, the results of the intrinsic valuation are compared to the ones of an equity research report of ODDO BHF.

2 Literature Review

The literature review in this section elaborates the state-of-art of the equity valuation literature and evaluates these approaches regarding the suitability for the valuation of Carlsberg.

2.1 Introduction to Valuation

"Valuation can be considered as the heart of finance" (Damodaran, 2006, p. 694) as every sensible decision in making business requires an understanding about what drives the firm value and how this value is estimated. Valuation determines the value of an asset, a business line, or a company. If a company is bought, sold or liquidated its value is estimated, but even for the determination of market efficiency, concerns about corporate governance or decisions between different investments, value estimates are useful to "identify sources of economic value creation and destruction within the company" (Damodaran, 2006; Fernández, 2007, p. 2).

Although, the goal of every valuation is to determine the fair market value, there are several ways to obtain this value, which in the end might result in different valuation outcomes. The most common valuation models rely on the determination of the intrinsic value through the discounted cash flow or the comparison of the firm with comparable market peers using multiples (Holthausen & Zmijewski, 2012).

All of the different valuation models are based on assumptions, different perspectives of analysts and certain market, industry or company specific circumstances that influence the forecasts and valuation estimates (Penman, 2006). Moreover, valuations are often biased by the collected information, already existing market prices or accounting distortions resulting from accounting flexibility (Damodaran, 2006).

2.2 Valuation Models

The first step in estimating the value of a company is to decide on the appropriate valuation model. There are various valuation techniques that require a critical assessment in order to determine the best model for the respective valuation.

According to Damodaran (2006) the different valuation models can be classified into four categories:

1. Discounted Cashflow Models
2. Liquidation and Accounting Valuation
3. Relative Valuation
4. Contingent Claim Models

In the following, each of the approaches is considered and shortly elaborated.

2.2.1 Discounted Cash Flow

Among practitioners and academics the discounted cash flow (DCF) is the standard valuation method (Koller, Goedhart, & Wessels, 2010). The value of the company equals the present value of its estimated future cash flows discounted at an appropriate discount rate that incorporate the cash flow's risks (Fernández, 2007; Luehrman, 1997).

Every cash flow discounting model is based on the following equation:

$$V_0 = \sum_{t=1}^{n} \frac{E(CF_t)}{(1+r)^t} + \frac{TV_n}{(1+r)^n} \qquad [1]$$

Where:

V_0 = Value of asset at time 0 | E(CFt) = expected future cash flow at time t
n = number of cash flows | r = discount rate | TV = Terminal Value

The DCF is a forward-looking valuation method and historical data solely influences the forecast assumptions. This implies, that the accuracy of this approach dependents on precise assumptions, the discount rate and the terminal value (Fernández, 2007).

The cash flows and the discount rate in equitation [1] vary depending on the assets being valued. The main variants of the discounted cash flow model are the free cash flow to the firm, the free

cash flow to equity, the dividend discount Model and the adjusted present value approach (Damodaran, 2006).

2.2.1.1 Free Cash Flow to the Firm

The most common approach in the DCF valuation, is the determination of the enterprise value (EV) through the free cash flow to the firm. This free cash flow "reflects the value of all claims on the firm" (Damodaran, 2006, p. 696) and is the cash flow available for the distribution to creditors and shareholder (Palepu et al., 2016).

To obtain the EV, equation [1] is adapted for the FCFF and the WACC as appropriate discount rate.

$$\text{Firm Value} = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{TV_n}{(1+WACC)^n} \quad [2]$$

The FCFF is defined as follows:

FCFF = EBIT * (1-Tax) – Capital expenditures + Depreciation – ΔWorking capital [3]

An alternative way to obtain the FCFF is to reverse the calculation of the free cash flow to equity. The payments to the debtholders and preferred stockholders are added to the FCFE, resulting in the FCFF.

FCFF = FCFE + Interest Expense * (1 – Tax rate) + Principal Payment [4]
– New Dept issues + Preferred dividends

2.2.1.2 Dividend Discount Model

The Dividend Discount Model (DDM) is the oldest variant of the discounted cash flow model (Damodaran, 2006) and focuses on the valuation of equity using future dividends. According to Fernández (2007) the dividends are part of the earnings that are paid to the shareholders and the share's value is the present value of the expected future dividends discounted at the required return on equity.

$$\text{Equity Value} = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{K_e} \quad [5]$$

In the case, the future dividend is expected to grow, the basic DDM model is extended by a constant annual growth rate (Fernández, 2007):

$$\text{Equity Value} = \frac{DPS_1}{K_e - g} \quad [6]$$

In practice, the DDM is seldomly used as the value estimates are too conservative and dividends do not display the value creation in a company (Miller & Modigliani, 1961). Due to the flaws of this Model, it is not used to estimate the value of Carlsberg.

2.2.1.3 Free Cash Flow to Equity

Another approach of directly valuing the equity of a company is to discount the FCFE at the cost of equity (K_e). Since, the discount rate represents the risks associated with the cash flow, the K_e is the required return of investors for holding a stake of equity in the company (Koller et al., 2010). The FCFE follows the underlying principle of the DCF calculation and thus, equation [1] can be reformulated as followed:

$$\text{Equity Value} = \sum \frac{FCFE_t}{(1+K_e)} + \frac{TV_n}{(1+K_e)^n} \quad [7]$$

The FCFE is the cash flow after reinvestments and debt payments that is available to the distribution among shareholders. Formally, it is calculated as followed (Damodaran, 2006):

$$\begin{aligned} \text{FCFE} = {} & \text{Net income} - \text{CapEx} + \text{Depreciation} - \Delta \text{ Non-Cash Working Capital} \\ & + (\text{New Debt issued} - \text{Debt Repayment}) \\ & - (\text{Preferred Dividend} + \text{New Preferred Stock Issue}) \end{aligned} \quad [8]$$

Another starting point to compute the FCFE is to derive it from the previously explained FCFF:

$$\text{FCFE} = \text{FCFF} - \text{Interest} * (1 - \text{taxes}) + \Delta \text{ Debt} \quad [9]$$

2.2.1.4 Adjusted Present Value (APV)

The APV model, first developed by Myers (1994) is based on the theory of Modigliani and Miller arguing that the choice of financial structure in a world without taxes does not affect the value of the assts (Koller et al., 2010). The APV separates the company's financing and investing activities by applying a concept of value additivity (Luehrman, 1997).

According to Damodaran (2006), the APV approach is calculated by adding the value of the financial side effects to the value of the operations of an all equity financed firm:

Value of business = Value of business with 100% equity financing
+ PV Interest Tax Shield [10]
- Expected bankruptcy costs

Compared to the WACC-based DCF models the APV is more versatile, flexible and reliable as it does not depend on a constant debt-to-value ratio and it requires less restrictive assumptions. Further, the APV enables to value companies with complex tax positions, changing capital structures or cross-border budgeting problems (Luehrman, 1997).

However, Damodaran (2006) also states that there are discrepancies among researches how to calculate the present value of interest tax shields. Moreover, some analysts overestimate the value of the business by ignoring the expected bankruptcy costs that are often difficult to estimate. In the case the company has a constant debt-to-value ratio the WACC-based DCF approach is simpler and more suitable method. The ITS and expected bankruptcy costs are further explained in Appendix 1.

2.2.1.5 Economic Value Added (EVA)

The EVA is based on the concept of NPV and capital budgeting, assessing profit maximization and shareholder wealth (Young, 1997). It estimates the value of a company "as a function of expected excess returns" (Damodaran, 2006, p. 732) by measuring the "difference between the return on a company's capital and the cost of that capital" (Young, 1997, p. 335).

The EVA is calculated in the following way:

EVA = (Return on capital invested – Cost of capital) * (Capital invested) [11]
= NOPLAT – (Cost of capital * Capital invested)

To compute the company's value, the value of the assets-in-place and the value of the expected future projects is added up and then discounted to the NPV:

$$\text{Firm value} = \text{Capital Invested}_{\text{Assets-in-place}} + \sum_{T=1}^{t=\infty} \frac{EVA_{t,\text{Assets-in-place}}}{(1+K_e)^t} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,\text{Future Projects}}}{(1+K_e)^t} \quad [12]$$

According to Young (1997) the EVA approach has become more popular as it does not contain the flaws associated with the estimation of the K_e. However, calculating the EVA is often not straightforward, difficult to apply at the divisional level and sensitive to input variations.

2.2.2 Input Factors for DCF Valuation

Cost of Capital

The cost of capital is the rate of return investors require from the company for their invested capital. It represents the opportunity cost of investors, as they have access to financial market investment opportunities (Brotherson et al., 2013).

In the DCF valuation models the cost of capital is crucial to discount the expected free cash flows to obtain the present value. The different financing models of a company and thus the different cash flows presented in the DCF models require different discount rates. The discount rates are the K_e which is used if the business is entirely equity financed, the K_d, if the company is funded only by debt and the WACC in the case the company is financed by a mix of debt and equity.

Weighted Average Cost of Capital (WACC)

The WACC is the rate to discount the expected FCFF and reflects the risks of the entire company. It is calculated by "weighting the cost of the debt and the cost of the equity with respect to the company's financial structure" (Fernández, 2007, p.16).

$$\text{WACC} = \frac{\text{D}*(1-\text{Tax rate})}{\text{E+D}} * \text{K}_\text{d} + \frac{\text{E}}{\text{E+D}} * \text{K}_\text{e} \qquad [13]$$

In order to compute the WACC, the capital structure and the risk profile of the company needs to be stable. Otherwise, the presented formula needs to be adjusted to compensate for effects causing additional risks like specific financing programmes, issue costs, exotic debt securities, tax shields or dynamic capital structures (Luehrman, 1997). Further, the capital structure presented in the WACC formula needs to be based on target capital structure measured in market values of debt and equity (Koller et al., 2010).

Cost of Debt

Incorporated in the WACC formula is the after-tax cost of debt. The cost of debt is the return external lenders require for lending their money to the company (Frykman & Tolleryd, 2003). It depends on the firm's debt size and its associated risks. To capture the risk that firms might not be able to pay the promised payments back, the lenders add a default risk to the riskless rate (Damodaran, 2010b), resulting in the following formula:

After-tax cost of debt = (Risk-free rate + Default Spread) * (1-Marginal Tax Rate) [14]

According to Damodaran (2010b) there are three components to estimate the cost of debt: the risk-free rate, the default spread and the tax rate. The risk-free rate is the same as used in the calculation of the cost of equity, presented later on in this section.

There are two possible approaches for the estimation of the default risk. First, if the company has issued bonds, the yield to maturity is a good proxy for the default risk. The issued bonds are usually rated by one of the established rating agencies such as S&P, Moody's or the Fitch Group. The rating agencies publish default spreads according to the respective rating. Second, if the firm is not rated but has outstanding debt a synthetic rating based on the financial ratios can be conducted. A simple approach is to base the rating on the interest coverage ratio of the company (EBIT/Interest expense) (Frykman & Tolleryd, 2003).

The last input is the tax rate. Interest expenses paid to the lenders, reduce the taxes paid. The accurate tax rate for this calculation is the marginal tax rate.

Cost of Equity

The cost of equity is the required return on shareholders' equity which is part of the WACC and further also used to discount the FCFE and dividends in the DDM. The most popular approach of calculating the cost of equity is through the capital-asset pricing model (CAPM), which converts the risks of investing in the company into the expected return (Fernández, 2007).

$$K_e = \text{risk-free rate} + ß * ERP \quad [15]$$

Where,

ERP = Equity Risk Premium = $E(r_m) - r_f$ | r_m = market return | ß = beta

The CAPM represents the relationship between the expected return on an asset and the systematic beta risk. The model explains the asset's sensitivity in respect to the systematic risk in a well-diversified portfolio. To calculate the cost of equity, the model requires the estimation of an appropriate risk-free rate (r_f), beta and an equity risk premium (ERP) (Frykman & Tolleryd, 2003).

Risk-free rate

The risk-free rate represents the time value of money and is the rate of return an investor receives when investing in an asset with no default risk (Fernández, 2007).

A proxy for the risk-free rate are long-term investments in government bonds or treasury bills assuming that they do not default (Damodaran, 2010b). Further, the maturity should be in line

with the investment horizon of the investor, thus it is recommended to use a 10-year government bond in the home country of the company. A lower investment horizon would dismiss the reinvestment opportunities and in longer periods the liquidity of the bonds is limited. (Damodaran, 2010b; Frykman & Tolleryd, 2003).

Equity Risk Premium

The equity risk premium, is the average risk premium an investor expects to receive when investing in a risky asset over an alternative risk-free investment. It is calculated as the excess return on the market over the risk-free rate.

According to Damodaran (2010a) there are three possible methods to estimate the equity risk premium. The first and also most common approach is to calculate the equity risk premium based on historical premiums. Thereby, the actual returns in a risk-free investment are compared to the historical stock returns. The second approach is the 'Survey Premiums' by which the investors, managers or academics are asked about the equity returns they expect in the future. Lastly, the ERP can be estimated by using implied premiums. This approach estimates a "forward-looking premium based on the market rates or prices on traded assets today" (Damodaran, 2010a, p. 15).

Beta

Beta is a measure of the systematic non-diversifiable risk of the stock returns reflecting its volatility regarding the market. This systematic risk cannot be eliminated by investing in a diversified portfolio (Fernández, 2007).

A riskless investment yields a beta of zero. A beta equal to one means that the companies changes in performance are similar to changes in the economy. Firms with betas higher than one are highly sensitive to economic changes and are thus perceived as risky investments. By contrast, firms with betas lower than one are less sensitive to economic changes (Palepu et al., 2016).

In order to estimate the value of the company's beta Koller et al. (2010) and Damodaran (2006) propose to regress stock returns (r_j) against market return (r_m) of a well-diversified portfolio. After the empirical estimation of the raw beta, the estimate needs to be improved by incorporating industry comparable and smoothing methods. To obtain accurate results they suggest to incorporate at least 60 observations of monthly returns.

Regression:

$$r_j = \alpha + ß * r_m \quad [16]$$

$$\text{where: } ß = \frac{\text{Cov}(r_j, r_m)}{\sigma_m^2} \quad [17]$$

Smoothing beta: $$\text{Adjusted beta} = \frac{1}{3} + \frac{2}{3} * \text{raw beta} \quad [18]$$

Another way to estimate the value of beta is to use the beta of similar companies or a sector beta (Frykman & Tolleryd, 2003).

Also, the degree of operating and financing leverage influences the beta. In the case a company is not entirely equity financed the incremental risk from "leverage must be added to the intrinsic systematic risk of the company's business", resulting in the levered beta (Fernández, 2007, p. 18). The following equation displays the relationship between the levered and unlevered beta. For the debt and equity, it is important to use market data.

$$ß_L = ß_U * (1 + \frac{D}{E}(1 - \text{Tax rate})) \quad [19]$$

Terminal value

After forecasting the explicit period, the company is expected to generate cash flows beyond this period. Cyclical companies may require a longer explicit period. For the selection of the terminal year, the company needs to be in a steady state. This means, that the company's revenue growth rate, NOPLAT, asset turnover, the financial structure and free cash flow growth are constant (Palepu et al., 2016).

The terminal value is a very important parameter in estimating a company's value and allows simplifying the assumptions for the forecasting periods beyond the terminal year. According to Frykman and Tolleryd (2003) the terminal value accounts for 70% - 80% of the company's value estimate. Further, it is important to consider that the expected growth of the firm can never be "greater than the average growth rate of the economy" (Palepu et al., 2016, p. 363).

Damodaran (2012) states three approaches of estimating the terminal value: First, the estimation of a liquidation value of the firm's assets. Second, the application of multiples to the firm's earnings or revenues and third, the use of a stable growth model assuming the company is in a steady state.

For the valuation of Carlsberg, a stable growth of cash flows and profits is expected. The following formulas are used to compute the terminal value in the different DCF valuation models.

$$\text{Terminal Value FCFE}_0 = \frac{\text{FCFE}_T * (1+g)}{(K_e - g) * (1+K_e)^T} \quad [20]$$

$$\text{Terminal Value FCFF}_0 = \frac{\text{FCFF}_T * (1+g)}{(\text{WACC} - g) * (1+\text{WACC})^T} \quad [21]$$

2.2.3 Valuation in Emerging Markets

The valuation in emerging markets is more difficult as in developed markets as investors face obstacles and greater risks (James & Koller, 2000). Therefore, company's often "reject good investment opportunities and underestimate the performance of existing businesses" (Goedhart & Haden, 2003, p. 3). However, according to Goedhart and Haden (2003) the investment in a diverse portfolio across different countries spreads the risks and is not more risky than investments in developed countries.

Recent research shows that there is only little agreement about the question how to perform a valuation in emerging markets. The models used are the same as in developed markets, only the assumptions vary as emerging markets entail additional risks (Goedhart & Haden, 2003; James & Koller, 2000).

There are two possibilities to account for the additional risks. Either, to incorporate the risk in the cash flows by conducting a DCF analysis and probability-weighted scenarios or to add a country risk premium (CRP) to the discount rate (James & Koller, 2000). James and Koller (2000) prefer the robust and solid cash flow method which incorporates macroeconomic and industry related. In contrast, adjusting the cost of capital by a country risk premium has several flaws. For instance, there is no systematic methodology to determine the premium and it is difficult to accurately account for specific risks (James & Koller, 2000).

For the valuation of Carlsberg, the risks in the different markets the company operates are incorporated in the discount rate including a CRP.

Further important valuation models such as the liquidation & accounting based valuation and the contingent claim model are presented in Appendix 2 and 3, respectively.

2.2.4 Relative Valuation

The relative valuation of a company is based on the value of similar assets in the market by which the value of a company is estimated relative to the market value of comparable firms. A multiples valuation first requires the identification of similar assets by selecting appropriate comparable companies in the market. Second, the prices need to be standardized by converting them into multiples based on common variables (Damodaran, 2006).

In practice, the relative valuation, is often used by analysts due to the simplicity of this method as the multiples valuation is not dependent on assumptions and detailed forecasts. Most analysts use multiples either on a stand-alone basis or to verify the results of the more complex DCF valuations (Liu, Nissim, & Thomas, 2007).

2.2.4.1 Peers

When performing a relative valuation, the selection of the comparable companies is crucial to obtain accurate results.

Koller et al. (2010) emphasise to select peers in the same industry with "similar growth, return on capital and ROIC characteristics" (Koller et al., 2010). Also, Foushee, et al., (2012, p.2) argue that only companies that "compete in the same market are subject to the same set of macroeconomic forces" and thus relevant for the peer group. Additionally, it is important that the value drivers are proportional (Kaplan & Ruback, 1995).

Damodaran (2006) further elaborates that if the cash flows and risks, the growth of comparable companies are identical, the set of comparable firms is not restricted to a specific industry.

In practice, it is often difficult to determine benchmark companies as they do not perfectly match. Even if the companies are operating in the same industry, they might have different capital structures, growth rates, risks and cash flows (Kaplan & Ruback, 1995).

For the selection of Carlsberg's peer group, a set of variables will be selected to determine the most similar companies with regard to Carlsberg's operating and financial performance, growth and macroeconomic conditions.

2.2.4.2 Multiples

To obtain the company value through multiples, first a particular multiple for a set of comparable companies is calculated. Multiples represent a ratio between the company's equity

or enterprise value and a common variable. Next, to estimate the company's target value the peers' multiple is multiplied with the corresponding value driver of the firm being valued (Liu et al., 2007). Value drivers are measures that are related to the company's revenues, earnings, cash flows or book values and are crucial for the determination of the enterprise or equity value (Holthausen & Zmijewski, 2012).

To reduce the influence of outliers, Liu at al. (2007) suggest to use a harmonic mean for the calculation of industry multiples instead of using the average or median.

$$\text{Harmonic mean} = \frac{1}{\frac{1}{n} * \sum \frac{\text{Price}}{\text{value driver}}} \quad [22]$$

According to Fernandez (2001) the use of multiples depends on the respective sector in which the company operates. He shows that price-to-earnings ratios (PER) and EV/EBITDA multiples are the most widely used multiples. However, Beneish et al. (2013) state that multiples based on earnings and expected returns incorporate flaws as earnings can be easily manipulated through the use of different accounting policies and the inclusion of non-operating items (Goedhart, Koller, & Wessels, 2005). Besides, the PER can also be affected by the changes in the capital structure thru the increase of leverage. The authors therefore suggest to use EV/EBITA or EV/EBITDA as they are less affected by distortions (Foushee et al., 2012; Goedhart et al., 2005).

Another important distinction is between trailing and forward multiples. Forward multiples are based on the forecasts, while trailing multiples rely on historical data (Liu, Nissim, & Thomas, 2002). According to Koller et al. (2010) forward looking multiples are more accurate as they take into account the future of the company, exclude sunk costs and one-time gains and losses. Liu et al. (2002) found that multiples based on earnings forecasts outperform historical earnings, cash flows and book-equity multiples. Further, the worst value driver are sales (Liu et al., 2007).

2.2.4.3 Limitations

The relative valuation needs less information than the intrinsic valuation of a company. This is a big advantage but at the same time it is also a big weakness. The selection of comparable firms is difficult and important value drives might be ignored. Further, as multiples reflect the market, the estimated multiples of comparable firms can be too high or too low by over- or

underestimating the market (Damodaran, 2010b). As mentioned above, multiples are affected by the capital structure and accounting distortions.

Given these limitations Holthausen and Zmijewski (2012) suggest to use multiple in conjunction with other valuation methods.

2.3 Final Considerations

The choice of the valuation models used for the valuation of Carlsberg was based on the advantages and disadvantages of the respective models in conjunction with company specific circumstances.

Thus, as primary valuation model, the WACC-based discounted cash flow to the firm is considered as the appropriate model as a stable target capital structure is expected and further this model overcomes the flaws of the APV. To account for different possible company's future states a sensitivity analysis is performed considering possible variations in the discount rate and growth of the company. The other valuation models are not taken into account for the previously explained reasons. In order to verify the results obtained through the DCF a relative valuation using price and enterprise multiples is conducted.

3 Strategic analysis

Before performing the forecasts and the valuation, it is crucial to analyse the company's strategic performance which aims at identifying whether Carlsberg is able to create value for its shareholders. In this context the internal as well as the external environment of Carlsberg is examined through an industry- and a SWOT analysis.

3.1 Industry analysis

The industry analysis is conducted by analysing the general beer market and the framework 'Porter's five forces'.

3.1.1 Beer Industry

The global beverages industry is divided into the segments soft drinks, beers, spirits, wines, ciders and flavoured alcoholic beverages (MarketLine, 2015). In the category alcoholic beverages, "beer is the most consumed alcoholic drink" (Colen & Swinnen, 2016, p.186) and accounts for 37% of the alcoholic drinks revenue (Statista, 2019).

In the global beer and cider market, beer is the largest segment with 97.6% market share, whereas cider only presents the remaining 2.4%. Geographically, the three largest consumer markets for beer are Europe with 32.7%, followed by Asia (30.3%) and the United States (19.7%) as figure 1 illustrates (MarketLine, 2019).

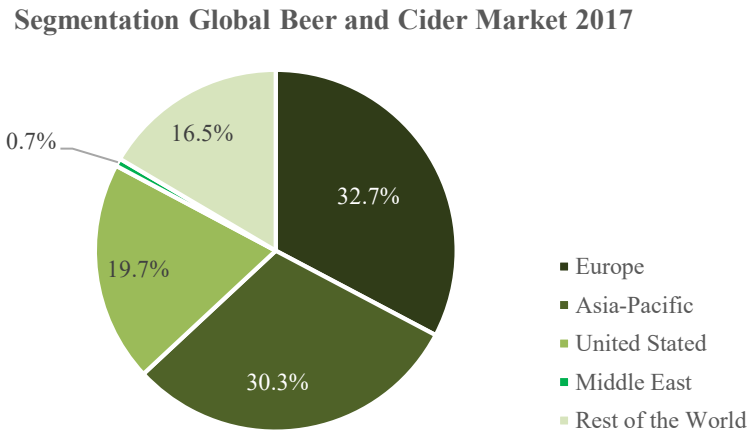


Figure 1: Segmentation Global Beer and Cider Market 2017 (MarketLine, 2019)

The following figure shows the CAGR of the last 5 years in different regions. In recent years, the sales volume in traditional beer markets such as Europe is declining, indicating a highly saturated market. In contrast, the beer consumption in emerging countries like Asia, Africa,

Central and South America increased rapidly (Colen & Swinnen, 2016; MarketLine, 2018b). However, despite the declining beer consumption in traditional markets "beer is the most valuable beverage category in the world with a high consumer penetration" (Carlsberg, 2016).

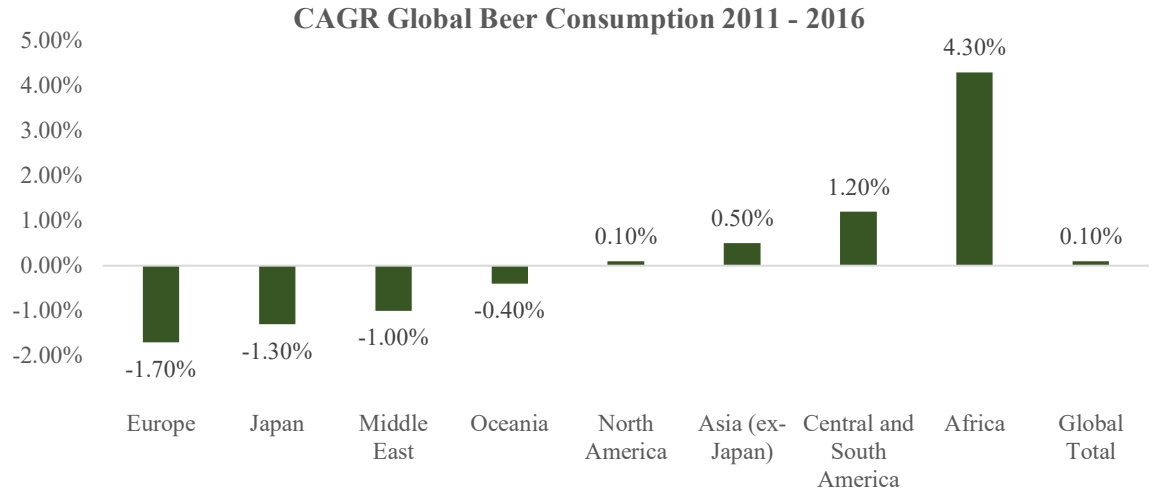


Figure 2: CAGR Beer Consumption 2011 - 2016 (JP Morgan, 2018)

Figure 3 illustrates the revenues and the respective CAGR in the years 2010 – 2013. Compared to the CAGR of 4.1% in the period of 2010 – 2018 the expected CAGR for 2018 – 2023 amounts to 3.6%. In terms of volume sales, the CAGR between 2010 – 2018 was 0.7% (Statista, 2019) and is expected to be 1% between 2017 and 2022 (MarketLine, 2019).

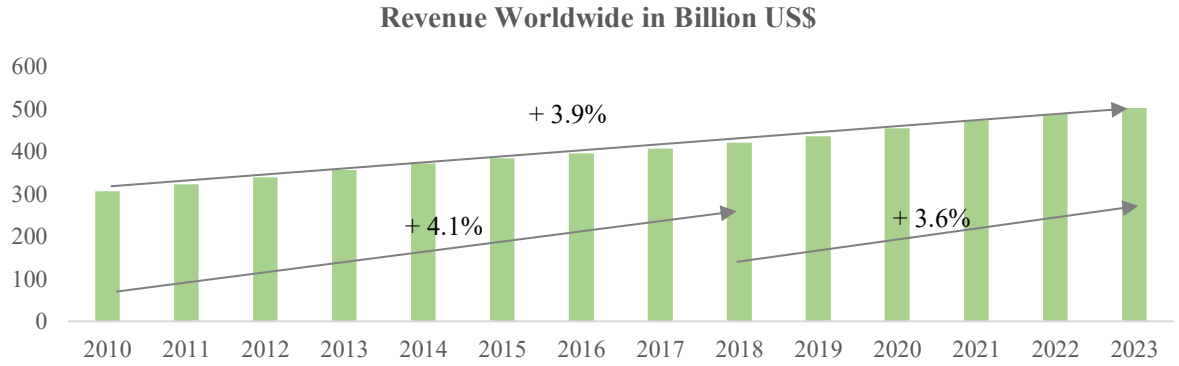


Figure 3: Revenue of Beer Worldwide in Billion US$ (Statista, 2019)

Recent trends show that the segments craft beer, alcohol-free and flavoured beverages are growing rapidly resulting from a lifestyle change that focuses on sensory and indulgence, smart and connected, urbanisation, health and wellness (Carlsberg, 2016; MarketLine, 2018b). Besides, consumers favour "drinking less but drinking better" (JP Morgan, 2018) which points out customers' willingness to pay more for high quality beer. In this context the premiumisation of beer plays an important role. From 1999 - 2017 the CAGR for premium and superpremium

was 3.1% respectively 5.0% compared to a CAGR of 1.6% for mainstream beer (Kevin Baker, 2018).

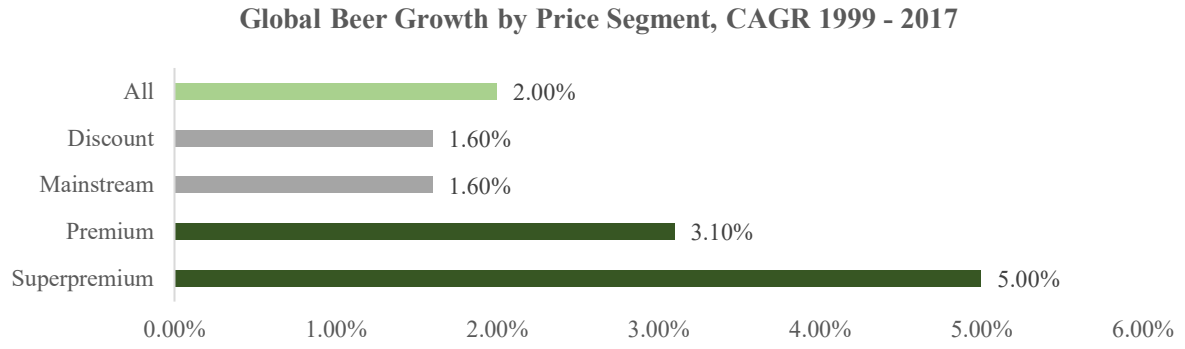


Figure 4: Global Beer Growth by Price Segment, CAGR 1999 – 2017 (Kevin Baker, 2018)

3.1.2 Porter's five forces

Rivalry among existing firms: The current beer market is dominated by four big players as displayed in figure 5: Anheuser-Busch InBev, Heineken, Molson Coors Brewing Company and Carlsberg. These four players account for a market value of 51.6% in 2017, whereby AB-InBev is controlling 28.2% of the market value mainly driven by the acquisition of its main competitor SABMiller in 2016. In comparison, the market share of Carlsberg accounts for 5.5% (MarketLine, 2019). In the last 20 years, numerous mergers and acquisitions in the beer sector took place to expand into new markets (Kevin Baker, 2018).

Moreover, as most brewing companies generate their main revenues by selling mass-market products such as lager, the fixed costs to operate the plants are high. Additionally, low switching costs of buyers, the moderate industry growth and the strong power of large retail chains cause the beer prices to drop downwards, which further increases the rivalry amongst competitors (MarketLine, 2019). The rivalry among existing firms is high.

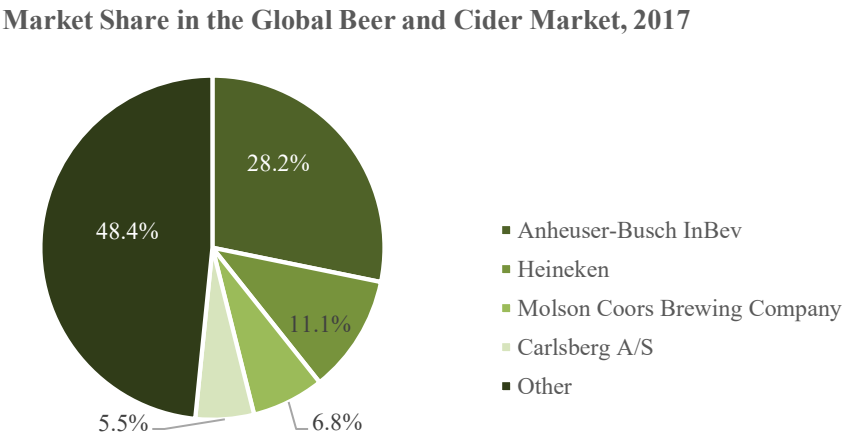


Figure 5: Global Beer and Cider Market Share, 2017, in % (MarketLine, 2019)

Threat of new entrants: The global beer market is controlled by large multinational companies. To enter this market, new entrants have to undertake large investments to fund the production facilities and distribution centres. For smaller companies the entrance into the beer market is difficult as brand identity, customer loyalty and reliable business partners throughout the value chain are essential. The dependency on the retail channels like supermarkets is high, which can drive the prices up and therefore the margins of the breweries down (MarketLine, 2019).

In the mass-market production, the margins tend to be much lower compared to small companies that only focus on the production of premium beer. Thus, new entrants may be more attracted by the premium sector and enter the market as 'microbreweries'.

Further, many countries have strict government regulations regarding brewing and selling alcoholic beverages, which reduces the number of new entrants (MarketLine, 2019). Consequently, the threat of new entrants is considered low.

Threat of substitute products: The threat of substitute products is considered to be high as the switching costs for customers and distributors are low due to many available substitutes for beer. First, there are lots of different beer brands and competitors offering the same types of beer. Second, other alcoholic beverages as wine and spirits or even cider, non-alcoholic or flavoured beers are substitutes for traditional beer.

The demand for beer is also dependent on the geographic area. In western European countries beer is the dominating alcoholic beverages, while southern European countries prefer wine. In Asia and Eastern Europe there is a strong tendency for consuming spirits (WHO, 2018). Besides, beer is a heavy beverage and is best when it is refrigerated before consumption, which might rise storage costs (MarketLine, 2019).

Bargaining power of buyers: In 2017 the biggest buyers for beer were on-trade businesses, followed by hypermarkets and supermarkets accounting for 57.6% respectively 24.2% of the sales. Favourably negotiated beer prices of important buyers and low switching costs for customers increase the bargaining power (MarketLine, 2019). Furthermore, the price sensitivity and the high elasticity of beer consumption increases the buyers' power even more. As figure 6 shows, in developed markets the price elasticity for alcoholic drinks is generally higher than in emerging markets (Euromonitor International, 2014).

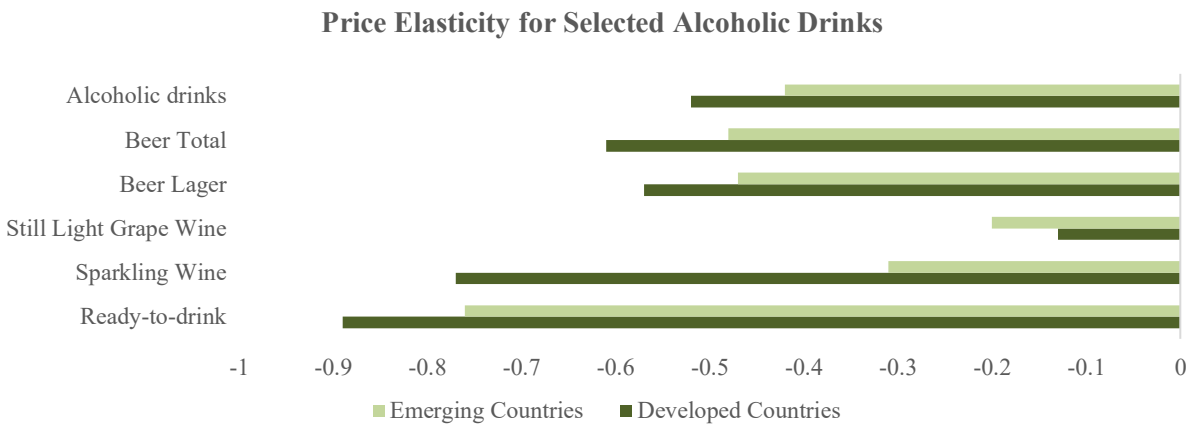


Figure 6: Price Elasticity Alcoholic Drinks, Developed / Emerging Countries, 2014 (Euromonitor International, 2014)

The bargaining power of buyers is further dependent on the geographic region. The western European market is saturated, highly competitive and the demand is declining, which increases customers power. The customer power in Eastern Europe is limited due to Baltika's market presence, which was acquired by Carlsberg. The growing demand for beer in Asia reduces the buyer power (MarketLine, 2019).

Consequently, the bargaining power of buyers is considered to be moderate to high.

Bargaining power of suppliers: The main ingredients to produce beer are hops, malted grain and water. The quality of these raw materials is crucial for a high-quality end product. Thus, many multinational brewing companies use vertical integration to better influence the quality of their beer which lowers the influence of suppliers (MarketLine, 2019). However, the breweries are dependent on these ingredients, which are often subject to price changes due to weather conditions (Barth-Haas Group, 2018).

The suppliers of breweries are small and local companies that are spread across the world which reduces their power. Though, barley producers can sell their products to various markets as animal feed or spirit producers and therefore reduce their dependence on the breweries and increase their power. Moreover, multinational breweries have a dominant market position which allows them to create competition among suppliers (MarketLine, 2019). Overall, the bargaining power of suppliers is assessed as low.

To sum up, the following illustration presents the previously described dimensions for the global brewing industry:

Figure 8: Porter's Five Forces – Global Brewing Industry

3.2 Company Overview

3.2.1 Key Facts about Carlsberg

The Carlsberg Group (Carlsberg S/A) founded in 1847 by Jacob Christian Jacobson and headquartered in Copenhagen is one of the world's leading brewing companies (Carlsberg, 2019a). A detailed history is presented in Appendix 4. Since 1970 Carlsberg is listed on the Copenhagen Stock Exchange (Carlsberg, 2019f). The worldwide well-know flagship brand of the company is Carlsberg, besides a diversified global and local product portfolio of 140 brands sold in 150 markets (Carlsberg, 2019a). In the fiscal year 2018 Carlsberg recorded revenues of DKK 62,503m, a reported growth in volume of 5.3% and an operating margin of 14.9% (Carlsberg, 2019c).

Carlsberg has issued A shares and B shares. For a par value of DKK 20 per share, A shares give the shareholders 20 votes per shares, whereas B shares incorporate 2 votes per share. The share prices are close to each other and the dividend paid is identical for both types, amounting to DKK 18 per share in 2018 (Carlsbeg Group, 2019). Figure 9 shows the distribution of A and B shares. A shares account for 22.1% and B shares for 77.9% of the total shares. Almost all of the A shares are hold by the Carlsberg foundation and are thus own shares of the company. The B shares are mainly free float. A detailed overview of the shares classes is presented in Appendix 5.

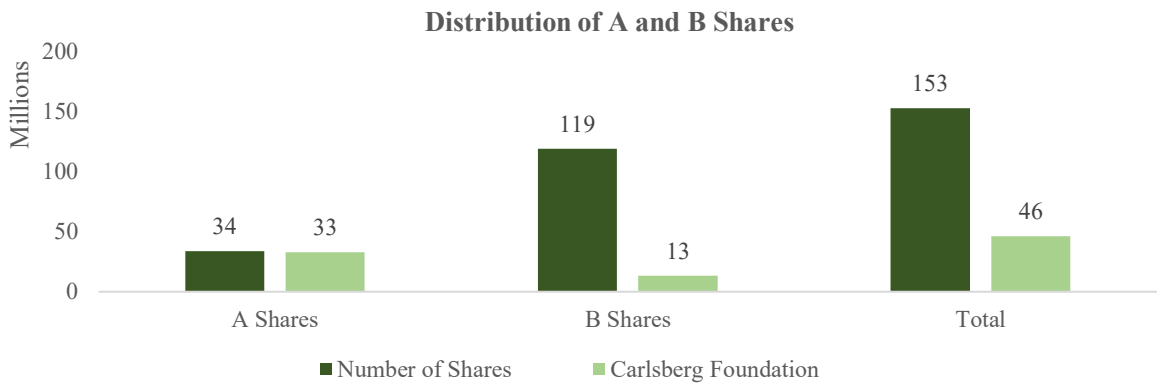


Figure 9: Distribution of A and B shares, Free float vs. Carlsberg Foundation

Figure 10 presents the share price evolution of Carlsberg within the last five years compared to the OMXC20. The OMXC20 is an index of the Copenhagen Stock Exchange consisting of the 20 most traded stock classes. The stock of Carlsberg generally follows the movements of the OMXC20, but the returns of Carlsberg are mostly lower than the index. In recent years the share price of Carlsberg has been increasing continuously with some minor fluctuations.

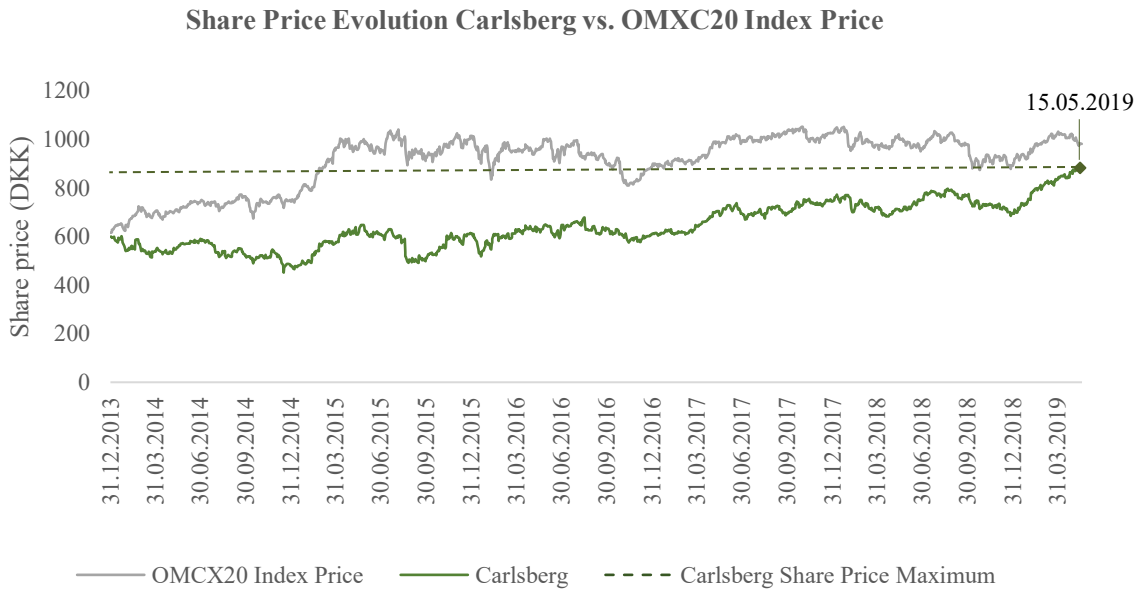


Figure 10: Share Price Evolution Carlsberg vs. OMXC20 Index Price, 2014 – 2019

3.2.2 Ownership Structure

In 1876 J.C. Jacobsen established the Carlsberg Foundation to secure the future of the brewing company with a focus on high-quality and innovative products. The Foundation must at least hold 51% of the total voting rights. Today, 30% of the share capital of Carlsberg S/A are owned by the Carlsberg Foundation which accounts for 75% of the voting rights. The remaining 30%

of capital, corresponding to 25% of the voting right, are free float as figure 11 displays (Carlsberg, 2019d).

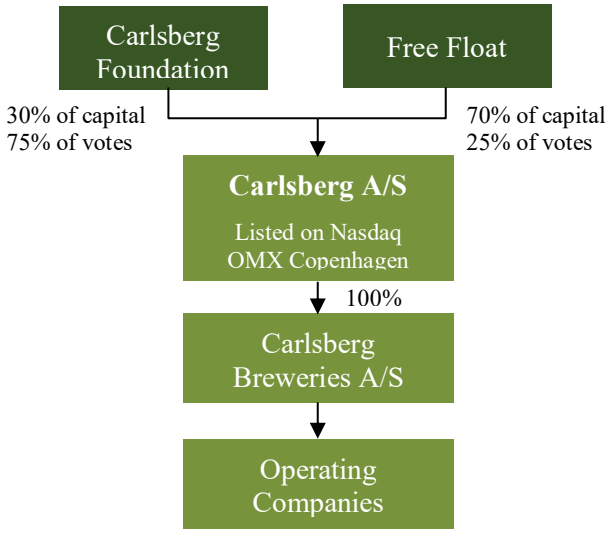


Figure 11: Ownership Structure Carlsberg S/A

3.2.3 Brands

After the foundation of the company in 1847, Carlsberg solely produced larger beer. Nowadays, Carlsberg offers a large and diversified product portfolio, targeting different premium and local customer segments around the world. Carlsberg, Baltika and Tuborg are the most known and sold brands in Europe (Carlsberg, 2019a). Other major brands of the company are Kronenbourg, Ringnes, Falcon, Grimerbergen, Somersby, Lav and Lvivske (MarketLine, 2018a).

Carlsberg's product portfolio is divided into core beers and growing categories. Core beers include international premium brands and local brands, whereas the growing categories contain a large number of craft and speciality, alcohol-free brews, water and cider (Carlsberg Group, 2019). The core segment accounts for 87% of Carlsberg's net beer revenues. As figure 12 presents the global brands have the highest presence in Asia (46%). In Eastern Europe and in Western Europe the presence of local brands is stronger.

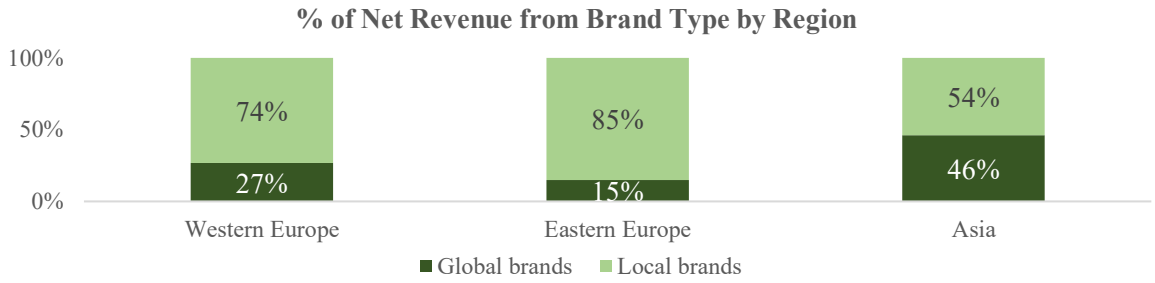


Figure 12: Percentage of Net Revenue from Brand Type by Region (Oeming, et al., 2019)

3.2.4 Markets

Carlsberg is operating in three different regions: Western Europe, Eastern Europe and Asia. In these markets the company operates through local breweries that are partially or fully owned by the Carlsberg Group. Besides that, license agreements, export partnerships and urban developments allow Carlsberg to be present in more than 100 markets worldwide where they do not have own breweries. Totally, Carlsberg serves customers in over 150 markets as shown in figure 13 (Carlsberg, 2019e).

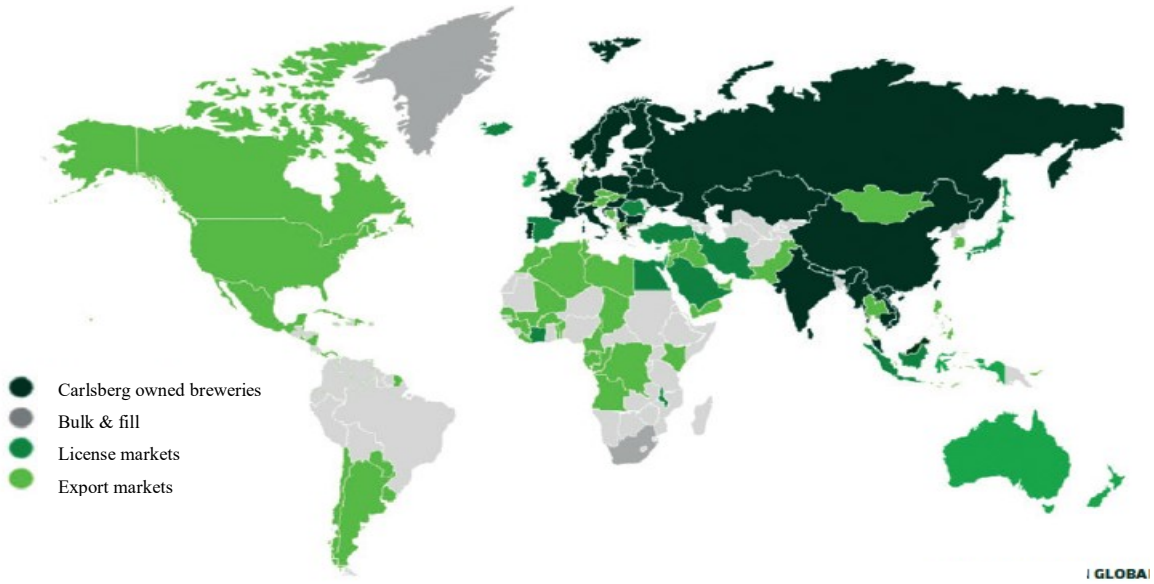


Figure 13: Global Presence of Carlsberg (Oeming et al., 2019)

In Western Europe, Carlsberg is the second largest beer brewing company and operates through 22 local breweries. This region accounts for 58% of the total revenues. The Eastern European market is the smallest region accounting for 17% of the revenues whereby Russia and the Ukraine are the main markets. In Asia, Carlsberg has a strong market position and is operating through a network of 41 breweries, where the majority is located in China. Table 1 summaries the main key facts about the three regions.

	Western Europe	Eastern Europe	Asia
Percentage of Revenue	58%	17%	25%
Breweries	22 Breweries	14 Breweries	41 Breweries
CAGR Revenue 5yr	-0.87%	-5.23%	4.45%
Main Markets	Poland, Germany, Finland	Russia, Ukraine	China, Cambodia, Vietnam
Current situation	highly saturated market, stable market environment	difficult political situation, restrictions regarding advertising and selling beer	Growth potential, promising market

Table 1: Key Facts Western Europe, Eastern Europe and Asia

3.2.5 Company Strategy and Business Model

"Probably the best beer in the world" is the tagline of Carlsberg which represents the companies high quality standards for beer brewing and the responsible use of resources to protect the environment (Carlsberg, 2019h). In accordance with this, in March 2016 Carlsberg launched its new strategy 'Sail 22'. The following key priorities of this strategy are designed to deliver shareholder value (Carlsberg Group, 2019):

1. **Strengthen the core**
2. **Position of growth**
3. **Create a winning culture**

The strategy aims at strengthening the core business, expanding the presence in the Asian market and sustaining the market leadership in Russia. Further focus is set on expanding in big cities and gaining a leader position in emerging markets trough the premiumisation of international and local beer brands and expanding the craft and low-or non-alcoholic beverage portfolio (Richard Milne, 2016). The strategy is split in two part. From 2016 – 2018 the focus was on 'funding the journey' including cost savings. From 2018 – 2022 Carlsberg will reinvest the money.

Since the launch of the new strategy Carlsberg was able to strengthen its brand performance, to optimise efficiency and to improve the overall operational performance (Carlsberg Group, 2019). As part of Sail'22, a share buyback program, starting in February 2019, was announced amounting to DKK 4.5bn (Carlsberg Group, 2019).

3.2.6 SWOT Analysis

In Appendix 7 a SWOT analysis of Carlsberg is presented, displaying the company's strength and weaknesses as well as the opportunities and threats.

4 Financial Analysis

The financial analysis presented in this section aims to analyse the relationship between the past performance, external factors and management decisions. The past performance is observed using key performance indicators and a ratio analysis.

4.1 Revenue

The following figure presents the revenues of Carlsberg in the last five years, segmented into the different operating regions. Total revenues decreased by a CAGR of -0.63% between 2015 to 2018. In Western Europe the revenues were stable in recent years, whereas in Eastern Europe they experienced a decline due to instable political situations and new regulations affecting the beer market. The beer market in Asia is a very promising region for Carlsberg. In the displayed period the revenues recorded a CAGR of 4.45%. The development of the total beverage volume is presented in Appendix 8.

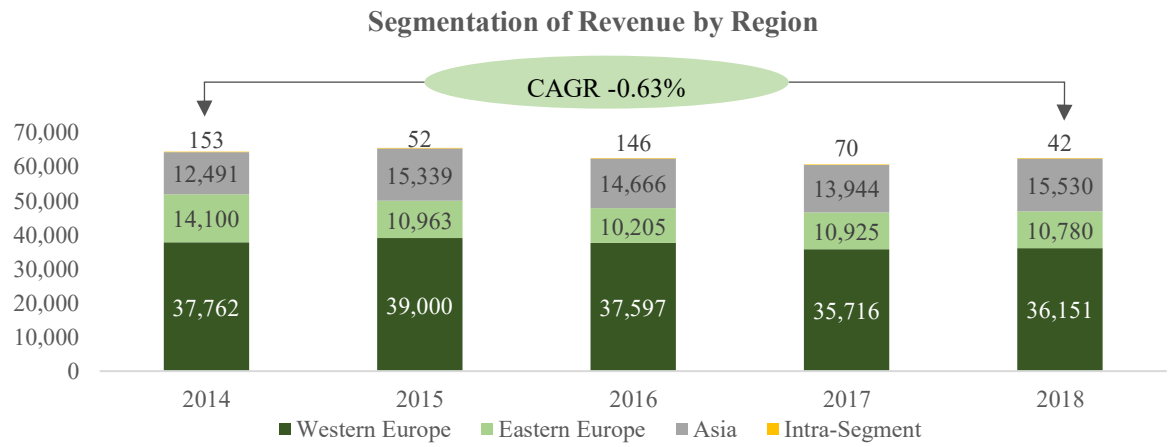


Figure 14: Segmentation of Revenue by Region 2014 – 2018 (Annual Financial Reports)

4.2 EBIT, EBITDA and Net Income

In the years 2014 to 2016 the EBIT and EBITDA decreased mainly due to higher operating expenses and D&A. The challenging financial situation was also reflected by the decrease in net income in 2016. The main reason for this was the drop in revenues in the Eastern European market due to advertising bans, night sales restrictions and kiosk bans as well as the PET ban of bottles larger than 1.5 litres. Since 2016, the company started their new strategy approach with a cost saving program, resulting in a higher ROIC. In 2017, the decrease in net income was caused by an impairment of the Baltika brand in Russia of DKK 4.8bn. Since the start of Sail'22 the company recovered from their difficult financial situation which is also reflected in the growing EBIT, EBITDA and ROE in 2018.

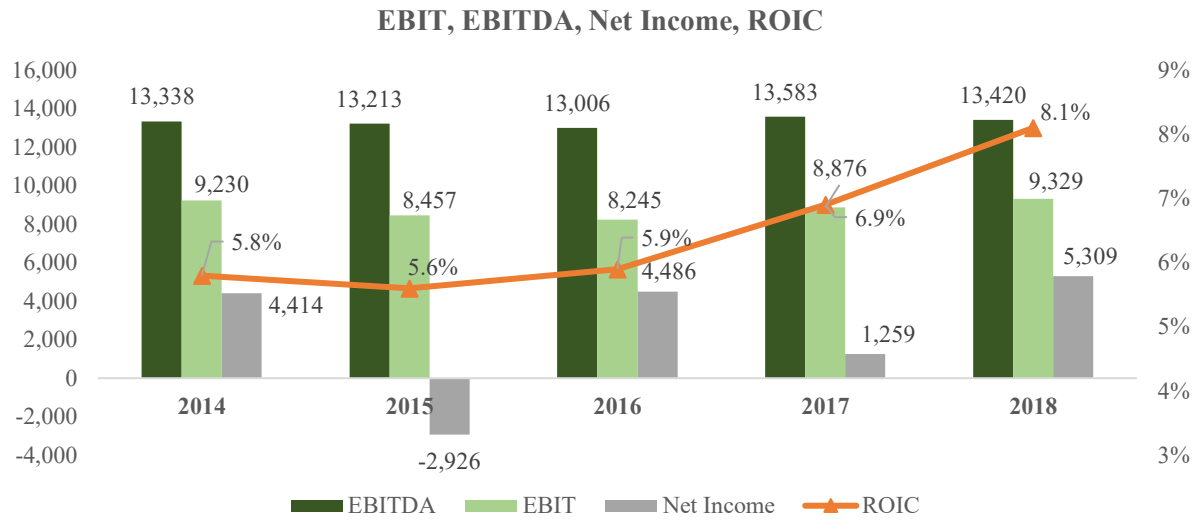


Figure 15: EBIT, EBITDA, Net income, ROIC; 2014 - 2018

4.3 Working Capital, Capital Expenditures and D&A

The investments in PPE and intangible assets decreased in 2015 and 2016, whereas D&A increased slightly. The decline of investments also reflects the decreased profitability in these years. In 2018, the CapEx and D&A were nearly equal. The working capital of Carlsberg diminished continuously in recent years. Carlsberg was able to reduce their cash conversion cycle, mainly due to the increased days payables and slightly reduced days receivables. This implies that the company is able generate cash quickly from selling their products, while having more time to pay their suppliers.

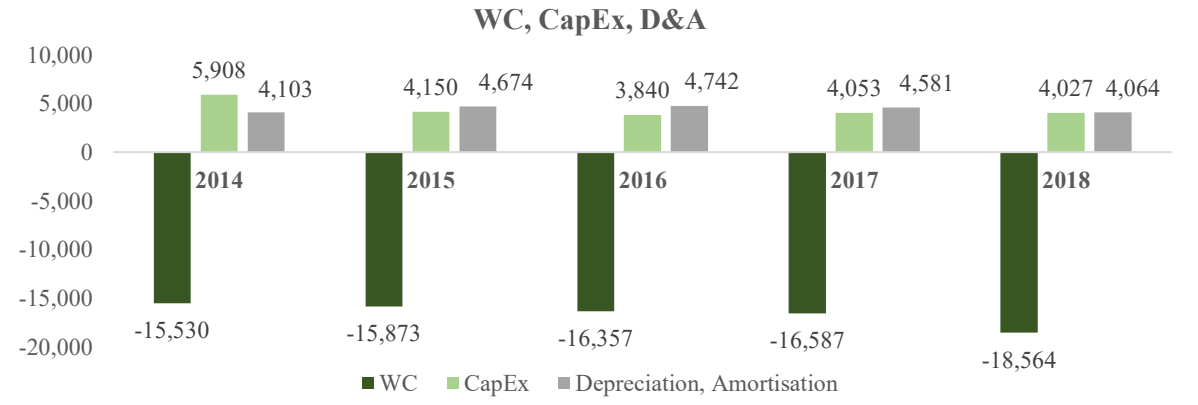


Figure 16: WC, CapEx, D&A; 2014 - 2018

4.4 Ratio Analysis

A detailed analysis of Carlberg's past performance was conducted through a ratio analysis which is presented in Appendix 9.

5 Valuation

To obtain the target share price of Carlberg, the WACC-based DCF was used as primary valuation model. To verify these results a relative valuation using multiples was performed.

5.1 Discounted Cash Flow Valuation

For the DCF valuation, the FCFF needs to be computed and discounted at the WACC in order to obtain the final stock price. These calculations require forecast assumptions which are elaborated in this section.

5.1.1 Forecasts

For the forecasts an explicit period of ten years is considered, including the years 2019 – 2028. In the last year, which is the terminal year, Carlsberg has reached a steady state. After this, the FCFF is estimated by using a terminal value.

5.1.1.1 Revenue Forecast

The revenue forecast is crucial for the valuation as the revenue is the value driver for many positions of the balance sheet and the income statement. To forecast the revenues, the regional break down and the main components that drive the revenue such as volume, price and transactions of acquisitions and disposals were taken into account.

However, as Carlsberg does not disclose information about their acquisition strategy, it is difficult to estimate the future acquisitions. Thus, the focus lies on the drives volume and price for which the organic growth of Carlsberg's revenues was considered. In addition to the historical movements, economic conditions, the expected GDP growth and the industry outlook in the respective regions was observed.

In accordance with Koller et. al (2010) the explicit period was divided into two periods. A detailed six-year forecast by breaking down the revenue into regions and a simplified forecast for the remaining four years in which revenues are expected to reduce by 15bsp each year until Carlsberg reaches the steady state in 2028.

The forecasts in the respective region are also driven by the Sail'22 strategy which states goals for the development of the company. After 'funding the journey' which was based cost savings, the company will reinvest the money in the years 2019 - 2022.

Western Europe: Western Europe is the main region of Carlsberg in terms of revenue and net income. Carlsberg's market share accounted for 11.7% in the European beer and cider market in 2018.

The GDP for the next years is expected to grow, but as income grows also the health awareness increases and customers change their alcohol consume towards premium beers, wine and spirits as well as low and alcohol-free beers. This implies a negative correlation between the GDP and the beer consumption in high-income countries (Colen & Swinnen, 2016). The customers in Western Europe seek variety and are willing to pay more for high quality beers. According to Sail'22 Carlsberg focuses on growing premiumisation, craft agendas and the expansion of low and alcohol-free beers. The market in Western Europe is highly mature, competitive which makes it difficult for Carlsberg to capture incremental potential in Western Europe.

Overall, the total revenues in Western Europe are expected to decrease in the next years. Further, they will grow at a lower rate than the industry expectations due to competition and a highly saturated market. This is also in line with past performance as the organic growth in the last five years was around 1% compared to 3.2% industry growth.

By analysing the volumes and average prices, the beer consumption is expected to stay at the industry level till 2022. Thereafter, the beer volume is expected to stagnate. In contrast to this, the volume of other beverages is anticipated to increase at a rate of 3% which is the average of the last 5 years' organic growth. It is higher as the industry, but this is in line with the historical movements comparing industry and organic growth. Then, it is expected to grow at the industry level of 1.9% (Statista, 2019).

Regarding the average selling prices, an increase is expected due to the premiumisation and speciality efforts. However, as competition is high among brewers and retailers, substantial investments in innovations and product development are required. Thus, a price increase of 0.5% is expected in the next four years followed by a lower increase of 0.3% from 2023 – 2024.

The GDP and industry growth rates for the different regions are provided in Appendix 10.

Western Europe	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Total Revenue	37,762	39,000	37,597	35,716	36,151	36,651	37,122	37,534	37,987	38,292	38,603
Organic growth	1%	0%	-1%	0%	3%	1.4%	1.3%	1.1%	1.2%	0.8%	0.8%
Total Volume	65.8	66.4	64.7	60.6	62.4	62.9	63.4	63.8	64.2	64.6	64.9
Beer	50	50.2	48.4	46.1	47.3	47.4	47.4	47.3	47.3	47.3	47.3
Organic growth	3%	0.0%	-2.0%	0.0%	3.6%	0.2%	0.0%	-0.2%	-0.1%	0.0%	0.0%
Other Beverages	15.8	16.2	16.3	14.5	15.1	15.6	16.0	16.5	17.0	17.3	17.6
Organic growth	6.0%	2.0%	2.0%	2.0%	5.9%	3.0%	3.0%	3.0%	3.0%	1.9%	1.9%
Average Selling Price	5.7	5.9	5.8	5.9	5.8	5.8	5.9	5.9	5.9	5.9	5.9
Growth		2.3%	-1.1%	1.4%	-1.7%	0.5%	0.5%	0.5%	0.5%	0.3%	0.3%

Table 2: Summary Total Revenue Forecast in Western Europe, 2014 – 2024, in DKK million

Eastern Europe: Eastern Europe is the smallest region of Carlsberg. The aim of Carlsberg in the next years is to strengthen the market leadership and grow the operating profit which will be driven by the premiumisation and craft & speciality beers. In 2018 volumes increased mainly due to the warm weather and the football world cup. In Russia, which is Carlsberg's biggest market in this region the revenues are linked to the Russian economy which is mainly driven by the oil prices and the price of imported products. Overall, the economy in Russia today is more stable than in recent years.

Due to the high competition and price wars in this region, the average selling price is expected to stay constant in 2019. Afterwards, it is expected to grow by 0.5% each year as Carlsberg has a strong market leadership position in Russia compared to its competitors, which gives them a competitive advantage. As the tense macroeconomic situation in Russia stabilised and the beer market in the Ukraine is also promising, the beer volume is expected to grow at 1% till 2022. After that the growth is anticipated to slow down to 0.7%. As in Western Europe, other beverages are expected to develop stronger at 5.5% which is the average of the organic growth last five years. However, the trend is anticipated to slow down to 2.2% till 2024.

Eastern Europe	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Total Revenue	14,100	10,963	10,205	10,925	10,780	10,919	11,116	11,319	11,526	11,678	11,832
Organic growth	-3%	2%	8%	-1%	9%	1.3%	1.8%	1.8%	1.8%	1.3%	1.3%
Total Volume	39.5	34	34.4	31.7	32.7	33.1	33.6	34.0	34.4	34.7	35.0
Beer Volume	37.8	32.3	32.4	29.8	30.6	30.9	31.2	31.5	31.8	32.1	32.3
Organic growth	-10%	-14.0%	1.0%	-8.0%	3.1%	1.0%	1.0%	1.0%	1.0%	0.7%	0.7%
Other Beverages	1.7	1.7	2	1.9	2.1	2.2	2.3	2.5	2.6	2.7	2.7
Organic growth	1.0%	2.0%	15.0%	-3.0%	7.8%	5.5%	5.5%	5.5%	5.5%	2.2%	2.2%
Average Selling Price	3.6	3.2	3.0	3.4	3.3	3.3	3.3	3.3	3.3	3.4	3.4
Growth		-9.7%	-8.0%	16.2%	-4.3%	0.0%	0.5%	0.5%	0.5%	0.5%	0.5%

Table 3: Summary Total Revenue Forecast in Eastern Europe, 2014 – 2024, in DKK million

Asia: The Asian market is a very favourable market for Carlsberg. Growth in Asia is mainly driven by the urbanisation, the expanding population, growing economies and an increase in the income level. Carlsberg is present in large countries in which revenues are driven by international core brands but has also a strong position in smaller Asian markets. Further, acquisitions in this region offer a growth potential for Carlsberg. Carlsberg's goal is to drive growth through premiumisation, which in turn increases the prices. In China, a big city approach is favoured by moving outside the core Western Chinese provinces to reach an expanded footprint in the next years. Another aspect of the upcoming strategy is to attract the younger generation in Asia. The Asian market is still an emerging market and is therefore subject to volatility which makes growth riskier than in other regions.

The total revenues in Asia are expected to grow at a CAGR of 3.0% from 2019 – 2024, mainly driven by the growth in beer volume. In 2019 and 2020 the growth is expected to be equal to the GDP growth as for lower income countries there is a positive correlation between the GDP and the beer consumption. It is higher than the industry expectations, but this is in line with past performance and also expected to continue due to Carlsberg's strong position. Further, the industry forecast includes Asia and the Pacific Area, which differs from the markets in which Carlsberg is operating and can be only seen as a rough proxy for the next years. The markets that drive growth for Carlsberg such as India, Cambodia and Vietnam are also markets with a high growth potential.

Other beverages are also expected grow at a rate of 9.0% in the next three years and thereafter at a slightly lower rate of 8.2% which is the average of the last four years. Driven by the price increases in the last years and the continuing trend of premiumisation the average selling price will grow at 2% the next three years and then at 1.5% till 2024.

Asia	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Total Revenue	12,491	15,339	14,666	13,944	15,530	16,707	17,975	19,161	20,226	21,262	22,349
Organic growth	11%	5%	4%	5%	13%	7.6%	7.6%	6.6%	5.6%	5.1%	3.0%
Total Volume	38.50	41.40	39.70	34.00	38.00	40.08	42.28	44.18	45.95	47.59	49.28
Volume	35	37.8	36.1	31.2	34.4	36.2	38.0	39.5	40.9	42.1	43.4
Organic growth	1%	2.0%	-2.0%	0.0%	8.6%	5.1%	5.1%	4.0%	3.5%	3.0%	3.0%
Other Beverages	3.5	3.6	3.6	2.8	3.6	3.9	4.3	4.7	5.0	5.5	5.9
Organic growth	12.0%	4.0%	9.0%	8.0%	11.6%	9.0%	9.0%	9.0%	8.2%	8.2%	8.2%
Average Selling Price	3.2	3.7	3.7	4.1	4.1	4.2	4.3	4.3	4.4	4.5	4.5
Growth		14.2%	-0.3%	11.0%	-0.3%	2.0%	2.0%	2.0%	1.5%	1.5%	1.5%

Table 4: Summary Total Revenue Forecast in Asia, 2014 – 2024, in DKK million

After estimating the revenues for the single regions, the intra-segment revenues are forecasted as percentage of the total revenues of the three regions (Appendix 10). As they were relatively stable in the past the average of 0.1% is considered to maintain in the future.

Segmented into the regional forecasts, figure 17 presents the total revenues for the explicit period.

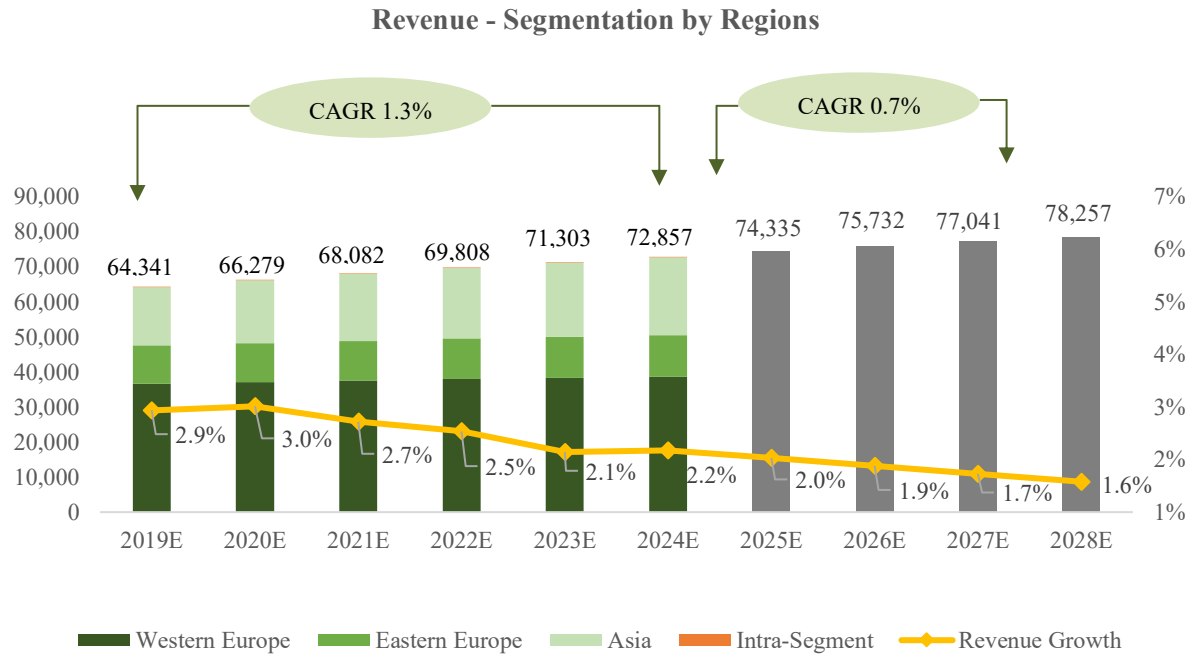


Figure 17: Forecasted Revenue segmented by Region; Growth Rates total Revenue

5.1.1.2 Special Items

Special items are expected to be zero in the future as they mostly include one-time items. Thus, as the special items are also included in depreciation and amortisation as well as staff costs, they are excluded from forecasts.

5.1.1.3 Operating Expenses

The operating expenses include the cost of sales and other operating expenses. The cost of goods sold are driven by the cost of materials which are dependent on input prices of malt, hops, glass, cans and other packaging materials. Carlsberg has developed a hedging strategy for hops, malt and aluminium to evade huge price changes of these inputs. As no information about the use of the single input materials is provided the cost of materials are estimated as percentage of revenues based on the average ratio of the last five years. Also, the machinery costs, the indirect production overhead and the purchased finished goods are directly linked to revenues.

In the past these items were relatively stable, hence it is anticipated that they remain constant during the explicit period based on the 2018 ratio as shown in table 5.

The direct staff costs, are forecasted based on the expected number of employees. Due to the cost saving program in the last three years, Carlsberg reduced their number of employees. In the next years they will still focus on tight cost control, but also take investments to grow further. Thus, in the next three years the average number of employees is expected to stay constant and then increase 0.5% each year. The detailed forecast is presented in Appendix 11.

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Cost of materials	18,100	17,558	16,178	16,147	17,252	17,372	17,895	18,382	18,848	19,252	19,671	20,070	20,448	20,801	21,129
% of revenues	28.1%	26.9%	25.8%	26.6%	27.6%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%	27.0%
Direct staff costs	1,412	1,469	1,364	1,357	1,365	1,390	1,390	1,390	1,397	1,404	1,439	1,418	1,425	1,432	1,439
% average employees	3.0%	3.1%	3.2%	3.3%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Machinery costs	881	955	873	0	0	0	0	0	0	0	0	0	0	0	0
% of revenues	1.4%	1.5%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Indirect production overheads	3,797	3,727	3,448	4,163	4,191	4,311	4,441	4,561	4,677	4,777	4,881	4,980	5,074	5,162	5,243
% of revenues	5.9%	5.7%	5.5%	6.9%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%
Purchased finished goods	5,645	6,632	6,065	5,517	5,626	5,791	5,965	6,127	6,283	6,417	6,557	6,690	6,816	6,934	7,043
% of revenues	8.8%	10.1%	9.7%	9.1%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Total Cost of Sales	29,835	30,341	27,928	27,184	28,434	28,863	29,691	30,461	31,205	31,850	32,549	33,159	33,762	34,328	34,855

Table 5: Forecasts Cost of Sales

Other expenses include sales and distribution expenses, administrative expenses, other operating expenses and the share of profit after tax of associates and joint ventures.

The sales and distribution expenses contain marketing, sales and distribution expenses. In recent years these expenses decreased followed by the cost control and cost savings. However, the strategy proposal illustrates that in the next years additional investments will be taken to increase brand awareness and the loyalty of the customers. The sales and distribution expenses are forecasted as percentage of revenues as they are directly linked to the sales of the products. As a result of additional investments, these expenses increase in the next two years and then decrease to 27% of revenues, which is the average of the last three years.

Administrative expenses, other operating activities and the share of profit tax after of A&JV also decreased in previous years. As Carlsberg does not disclose information about their investment strategy in A&JV other expenses are linked to revenues, they are anticipated to remain constant at the level of 2018 based on revenues.

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Sales, distribution expenses	-17,937	-18,290	-17,438	-16,164	-16,529	-17,629	-18,161	-18,314	-18,778	-19,181	-19,263	-19,624	-19,993	-20,339	-20,676
% of revenues	-27.8%	-28.0%	-27.9%	-26.6%	-26.4%	-27.4%	-27.4%	-27.0%	-27.0%	-27.0%	-27.0%	-27.0%	-27.0%	-27.0%	-27.0%
Administrative expenses	-4,173	-4,109	-4,764	-4,099	-4,318	-4,446	-4,580	-4,704	-4,824	-4,927	-5,056	-5,159	-5,256	-5,347	-5,431
% of revenues	-6.5%	-6.3%	-7.6%	-6.8%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%	-6.9%
Other oper. activities, net	369	235	198	113	68	68	68	68	68	68	68	68	69	69	69
% of revenues	0.6%	0.4%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Share profit after tax A&JV	408	364	324	262	130	130	130	130	130	130	130	130	130	130	130
% of revenues	0.6%	0.6%	0.5%	0.4%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

Table 6: Forecast Other Expenses

5.1.1.4 Capital Expenditures

The capital expenditures (CapEx) are decomposed into investments in PPE and IA as well as other investments in PPE. Thus, investments in PPE and IA relate to non-current assets and are therefore linked to D&A.

In recent years the CapEx first decreased and then stayed stable at around 6% of total revenues. Till 2018 ratio CapEx/Depreciation was below 1 which implies an underinvestment. The main reason for this was the cost saving program in course of the Sail'22 strategy. In 2018 CapEx and D&A were nearly equal.

For future periods substantial innovations are expected as the 'Funding the Journey' stage of Sail'22 is completed. Further, Carlsberg wants to increase its top-line growth which is only possible with additional investments as shown in table 7.

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
CapEx	5,908	4,150	3,840	4,053	4,027	4,517	4,653	4,779	4,901	5,005	5,115	5,218	5,316	5,408	5,494
% of Revenue	9.16%	6.35%	6.13%	6.68%	6.44%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%
Total D&A	4,108	4,756	4,761	4,707	4,091	4,338	4,469	4,590	4,707	4,807	4,912	5,012	5,106	5,194	5,276
CapEx/D&A	1.44	0.87	0.81	0.86	0.98	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
% of Revenue	6.37%	7.28%	7.60%	7.76%	6.55%	6.74%	6.74%	6.74%	6.74%	6.74%	6.74%	6.74%	6.74%	6.74%	6.74%

Table 7: Forecasts Capital Expenditures

The goal of the company is to achieve a CapEx of DKK 4.5bn in 2019 which also seems realistic considering the reasons explained. After this, the investments are expected to stay at this level in percent of revenues in order to achieve the goals of Sail'22. The investments are also reflected in the CapEx/Depreciation ratio of 1.04. Under these assumptions, CapEx and D&A are

developing almost simultaneously as shown in figure 18. The detailed forecast is presented in Appendix 12.

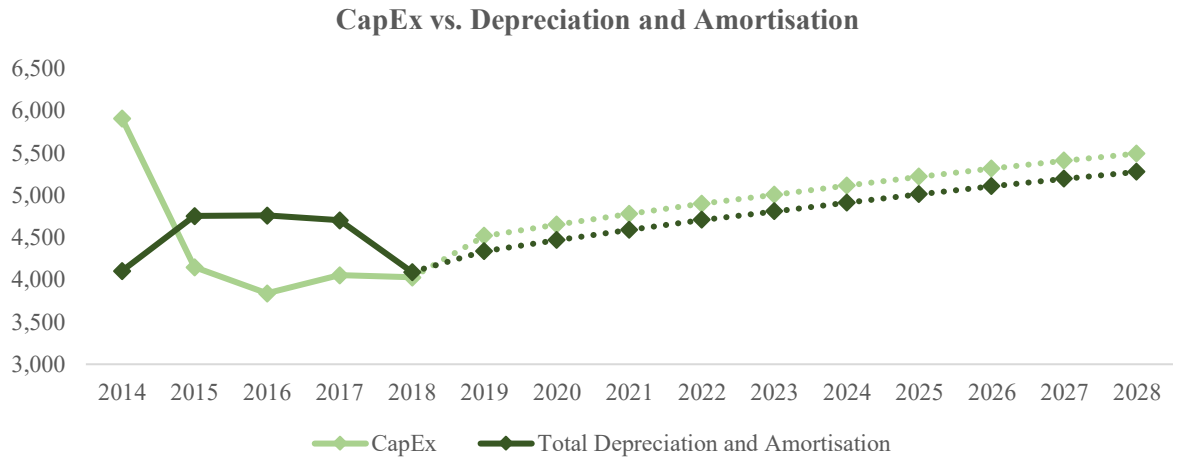


Figure 18: CapEx and D&A

5.1.1.5 Depreciation and Amortisation

Depreciation, amortisation and impairment losses are directly connected to PPE and IA. D&A and impairment losses decrease the value of these assets, while CapEx increases PPE and IA. To avoid any circular references D&A are forecasted as percentage of the asset value in the respective year. For the impairment losses the same approach was applied. D&A and impairment losses are assumed to stay constant over the explicit period based on the 2018's ratio, resulting in 14.5% depreciation and 0.8% amortisation.

In order to compute D&A, PPE and the IA need to be estimated. PPE and IA are forecasted as percentage of revenues and are expected to stay constant over the explicit period, accounting for 40.6% for PPE and 107% for IA as shown in table 8.

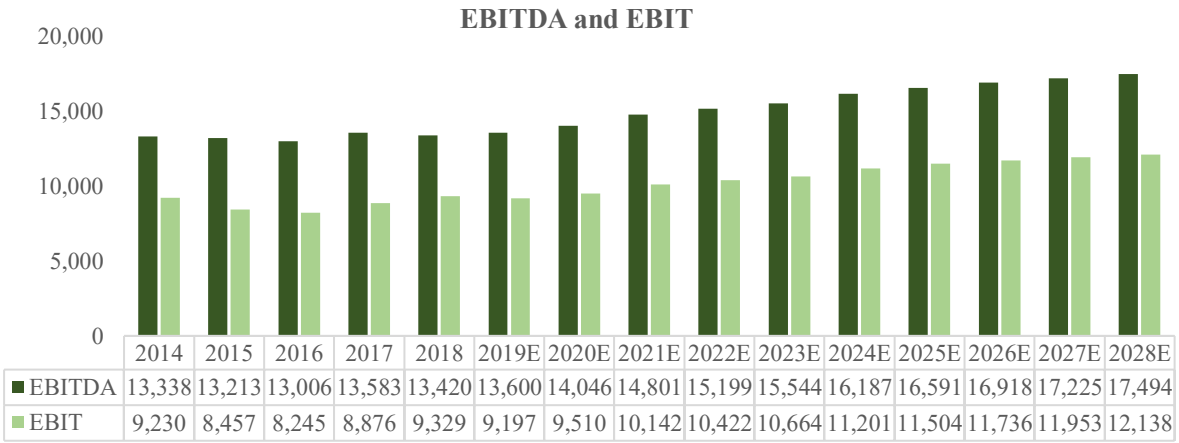
in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
PPE	29,173	26,678	25,810	24,325	25,394	26,122	26,909	27,641	28,342	28,949	29,580	30,180	30,747	31,279	31,772
% of revenue	45.2%	40.8%	41.2%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%
Depreciation	3,789	4,119	3,932	3,942	3,554	3,788	3,902	4,008	4,110	4,198	4,289	4,376	4,458	4,535	4,607
% PPE	13.0%	14.1%	14.7%	15.3%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%	14.5%
Impairment	898	1,456	306	47	67	65	67	69	71	72	74	75	77	78	79
% PPE	3.1%	5.0%	1.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Intangible Assets	82,409	72,920	76,736	67,793	66,868	68,776	70,848	72,775	74,620	76,218	77,879	79,459	80,952	82,351	83,652
% of revenue	1.28	1.12	1.23	1.12	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Amortisation	319	637	829	765	537	550	567	582	597	610	623	636	648	659	669
% Intangible Assets	0.4%	0.8%	1.1%	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Impairment	35	6,716	920	4,767	0	0	0	0	0	0	0	0	0	0	0
% Intangible Assets	0.0%	8.1%	1.3%	6.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total D&A	4,108	4,756	4,761	4,707	4,091	4,338	4,469	4,590	4,707	4,807	4,912	5,012	5,106	5,194	5,276
Total Impairment loss	933	8,172	1,226	4,814	67	65	67	69	71	72	74	75	77	78	79

Table 8: Forecast PPE, IA, D&A

5.1.1.6 EBIT and EBITDA

After forecasting revenues, cost of sales, other expenses and D&A, the EBIT and the EBITDA are calculated for the explicit period.



	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
EBITDA	13,338	13,213	13,006	13,583	13,420	13,600	14,046	14,801	15,199	15,544	16,187	16,591	16,918	17,225	17,494
EBIT	9,230	8,457	8,245	8,876	9,329	9,197	9,510	10,142	10,422	10,664	11,201	11,504	11,736	11,953	12,138

Figure 19: EBIT and EBITDA

5.1.1.7 Working Capital

In order to calculate the working capital of Carlsberg all current operating assets and liabilities are extracted from the balance sheet. The current operating assets include inventory, trade receivables, prepayments, tax receivables and other receivables. Opposite to the assets, the

current operating liabilities such as trade payables, tax payables, deposits on returnable packaging material, provisions, and other liabilities are subtracted from the operating asset.

It is important to consider that Carlsberg also includes financial accounts, particularly derivative financial instruments, in other receivables and other liabilities. As these are non-operating items, they are excluded from the calculation of the working capital.

Since 2015, Carlsberg had a negative working capital, which implies that the company's current operating liabilities exceed the current operating assets. Moreover, also the cash conversion cycle is below zero and decreased even further in the last years. This shows the efficient cash management of Carlsberg, meaning that they are getting paid by the customers before they are paying their suppliers. These cash raising activities also reflect the efforts in their strategic change.

For the forecast of the single items included in the working capital, it is assumed that Carlsberg will continue having a negative working capital. Besides that, also the payment conditions are expected to stay the same. Thus, trade receivables are forecasted using the days sales outstanding (DSO) which are based on revenues. Inventory and trade payables are estimated using the cost of sales as value driver by calculating the days inventories outstanding (DIO) and days payables outstanding (DPO). The DIO refer to the days the company takes to turn its inventories into sales and DPO indicates the time Carlsberg takes to pay suppliers. All these ratios will stay equal as in 2018.

Items included in other current receivables and liabilities are also expected to remain constant over the explicit period based on the year 2018. Deposits on returnable packaging materials, prepayments and other liabilities are based on the respective years cost of sales. Other receivables are linked to revenues. Provisions, tax receivables and payables are anticipated to remain the same as in 2018.

Further, also the deferred tax assets and liabilities are part of the FCFF and are incorporated into the working capital calculation. Deferred tax assets and liabilities are not included in the current assets and liabilities in the balance sheet, but they are still part of the operations.

The values for the deferred tax assets and liabilities are estimated as a percentage of revenues and are assumed to maintain the same ratio as in 2018 until the end of the explicit period. In the last years the net deferred taxes were negative which implies that Carlsberg's income taxes are

higher than the tax refunds the company receives. This trend is expected to continue as the revenues are predicted to grow.

Table 9 presents the summary of the working capital forecast and the respective change in working capital which are included in the FCFF. The detailed forecast assumptions are presented in Appendix 13.

Working Capital Summary	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Inventories	4,435	4,244	4,361	4,469	4,575	4,667	4,762	4,866	4,958	5,044	5,123
Trade receiveables	5,084	5,004	5,155	5,295	5,430	5,546	5,667	5,782	5,890	5,992	6,087
Other current operating assets	2,866	3,019	3,101	3,177	3,250	3,314	3,380	3,446	3,507	3,563	3,616
Trade payables	16,199	15,118	15,534	15,921	16,298	16,626	16,964	17,337	17,663	17,968	18,252
Other current operating liabilities	10,784	11,116	11,368	11,602	11,829	12,027	12,232	12,457	12,654	12,839	13,010
Deferred Tax Assets	1,693	1,737	1,790	1,838	1,885	1,925	1,967	2,007	2,045	2,080	2,113
Deferred Tax Liabilities	5,659	5,855	6,031	6,195	6,353	6,489	6,630	6,764	6,892	7,011	7,121
Net Working Capital	-18,564	-18,086	-18,528	-18,939	-19,341	-19,690	-20,051	-20,457	-20,809	-21,138	-21,444
Δ Operating Working Capital	-1,977	478	-442	-411	-402	-349	-361	-407	-351	-329	-306
Days Inventories	47	47	47	47	47	47	47	47	47	47	47
Days Reveivables	28	28	28	28	28	28	28	28	28	28	28
Days Payables	171	171	171	171	171	171	171	171	171	171	171

Table 9: Summary Working Capital

5.1.1.8 Tax Rate

As Carlsberg has to pay taxes during the forecasting period, the historical effective tax rate was observed. Carlsberg discloses the effective tax rate before and after the impairment of brands. The impairment of brands was very volatile in recent years and difficult to predict, thus for the estimation of the tax rate these one-time effects are excluded and the adjusted effective tax rate is taken into account.

In respect to the company's strategy, it was disclosed that the aim is to achieve an effective tax rate below 28%. In 2018 Carlsberg reached a tax rate of 28%. Based on the historical analysis for it seems reasonable that the tax rate will decrease slightly in 2019. Thus, for 2019 an effective tax rate of 27% are assumed. As it is difficult to foresee changes, this tax rate is assumed to maintain constant over the explicit period.

5.1.1.9 Financial Statement Forecast

The above presented forecasts are prepared to obtain the FCFF. In addition, to provide a holistic viewpoint of the financial situation of Carlsberg, the Balance Sheet and the Income Statement are projected for the next six years presented in Appendix 14 and 15.

5.1.2 Weighted Average Cost of Capital

The weighted average cost of capital is rate with which the FCFF is discounted in order to reach the share price of Carlsberg. After computing several input variables as the cost of equity, the cost of debt and the target capital structure the WACC reached a value of 6.47%. The summary below shows the different inputs and in the next subsections, these inputs are presented in more detail.

WACC					
Cost of equity	7.68%	E/V	81.39%	Tax Rate	27%
After-tax cost of debt	1.62%	D/V	18.61%		
WACC	**6.47%**				

Table 10: Summary of the WACC Computation

5.1.2.1 Cost of Equity

The cost of equity is an important component for the WACC computation and estimated by using the CAPM. The three main components that need to be estimated are the risk-free rate, the beta and the ERP.

For the risk-free rate the yield of the 10-year Danish government bond was used because the risk-free rate needs to be in the same currency as the financials of the company. As the headquarter of Carlsberg is in Copenhagen, consequently the company presents its financial in DKK and hence the Danish government bond represents the appropriate yield for the risk-free rate resulting in 0.236%.

To obtain the beta, the companies percentage change in weekly returns were regressed against the percentage change in weekly returns of the STOXX600 taking into account the last six years. The STOXX600 was chosen as it is a well-diversified index including international companies that are operating worldwide. The beta resulting from the regression is 0.84.

To determine the equity risk premium the countries in which Carlsberg operates are considered. The ERP for the respective countries was extracted from Damodaran. These premiums already include a country risk premium, reflecting the additional risk of operating in this country. Then, the ERP for the respective region was estimated by determining the importance of the country by using the beer consumption provided in the annual report. After that the ERP was estimated by using a weighted average of the regional premiums based on the actual sales in 2018 which resulted in an ERP of 8.8%. The detailed country overview is presented in Appendix 16.

After determining all inputs as presented in table 11 a cost of equity of 7.68% was achieved.

Cost of Equity

risk-free rate	0.24%	Beta (levered)	0.84	Equity risk premium	8.84%
Cost of equity	**7.68%**				

Table 11: Inputs for the Computation of the cost of Equity

5.1.2.2 Cost of Debt

In order to obtain the cost of debt, the yield of the issued bonds of Carlsberg was observed as the bonds outstanding account for majority of Carlsberg's debt as the figure below shows.

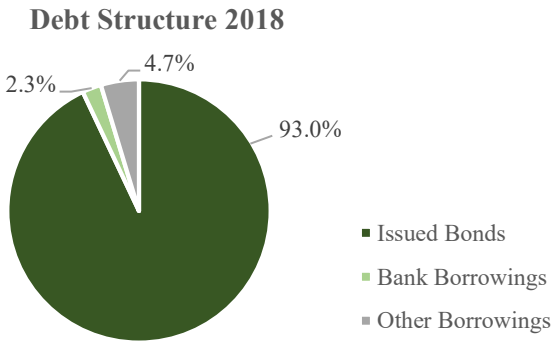


Figure 20: Debt Structure of Carlsberg in 2018

Table 12 illustrates the issued bonds, their maturities and yields.

Issued Bonds

Number	Issue Date	Maturity	Currency	Amount Issued (in Mio.)	Weight	YTM	Coupon
1	06.09.2017	06.09.2023	EUR	500.00	0.17	0.627%	
2	28.05.2014	28.05.2024	EUR	1,000.00	0.33	2.616%	
3	15.11.2012	15.11.2022	EUR	750.00	0.25	2.685%	2.625%
4	03.07.2012	03.07.2019	EUR	750.00	0.25	2.724%	2.625%
Weighted pre-tax cost of debt EUR						2.33%	

Table 12: Issued Bonds

The bonds are issued in Euro, however Carlsberg presents their financials in Danish Krones. Hence, the weighted yield was converted into DKK by first calculation the spread in EUR. For this, the German risk-free rate with the same average maturity as the issued bonds was deducted from the average yield of the bonds in EUR. Thereafter, the EUR yield was adjusted for the Danish risk-free rate with the same maturity resulting in the K_d before taxes. To determine the after-tax K_d, the pre-tax K_d needs to be adjusted for the marginal tax rate which is assumed to equal the effective tax rate, resulting in a cost of debt of 1.62%.

After-tax cost of debt					
Pre-tax cost of debt EUR	2.33%	Rf german government bond*	-0.28%	Spread EUR	2.61%
Rf Danish govenment bond*	-0.36%				
After-tax cost of debt	**1.62%**				

Table 13: Computation after-tax cost of Debt

*same maturity as issued bonds

5.1.2.3 Target Capital Structure

The last components for the estimation of the WACC are the market values of debt and equity. As explained in the literature review, these values should represent the target capital structure. The historical capital structure of Carlsberg illustrates that the debt/equity ratio decreased from 2014 – 2016. In the last two years the capital structure stayed constant at around 50%. In the Sail'22 strategy Carlsberg discloses the goal to maintain a constant capital structure at a leverage ratio below 2.0x, which was already achieved in 2018. Thus, the capital structure is assumed to remain at the current level.

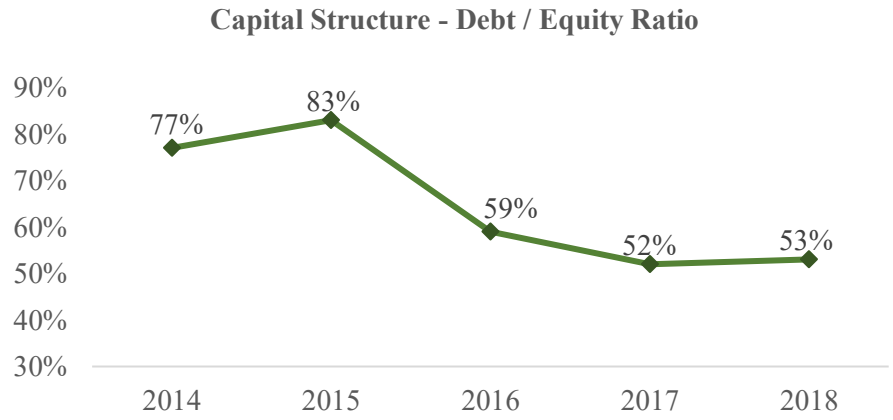


Figure 21: Capital Structure Carlsberg 2014 – 2018; Source: Thomson Reuters Eikon

The market value of equity is represented by the market capitalization, which is calculated by multiplying the shares outstanding by the current share price. The respective values are displayed in table 14.

The market value of debt is assumed to equal the book value of debt as the YTM of issued bonds is almost similar to the coupons of the bonds as shown in table 12. Further as figure 20 illustrates, the amount of bank and other borrowings only represents 7% of Carlsberg's debt.

After estimating the market values of debt and equity, the capital structure was determined. With a weight of 81.39% Carlsberg funds the majority of its operations through equity. The remaining 18.61% is related to debt.

Market Values Debt and Equity (in Mio. DKK)			
Number of A-Shares Outstanding	33.70	Share Price A-Shares	670.00
Number of B-Shares Outstanding	118.86	Share Price B-Shares	692.60
Market Value of Equity	104,899.00	**Market Value of Debt**	23,983.00

Table 14: Market Value of Debt and Equity

5.1.3 Target Price of DCF Valuation

After determining all the inputs, the FCFF of Carlsberg was calculated for the explicit period according to equation [3]. Table 15 illustrates the steps to reach the Free-Cash-Flow. The starting point is the EBIT which was obtained by subtraction the operating expenses from the revenues. After that, the net operating profit after tax (NOPLAT) was calculated by deducting the taxes, assuming a tax rate of 27%. Further, the forecasted D&A was added and impairment losses, CapEx and changes in working capital were subtracted resulting in the FCFF.

FCFF	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
EBIT	9,197	9,510	10,142	10,422	10,664	11,201	11,504	11,736	11,953	12,139
- Taxes on EBIT	2,483	2,568	2,738	2,814	2,879	3,024	3,106	3,169	3,227	3,277
NOPLAT	6,714	6,942	7,403	7,608	7,785	8,177	8,398	8,567	8,726	8,861
+ Depreciation	3,788	3,902	4,008	4,110	4,198	4,289	4,376	4,458	4,535	4,607
+ Amortisation	550	567	582	597	610	623	636	648	659	669
- Impairment PPE and IA	65	67	69	71	72	74	75	77	78	79
- Δ Operating WC	478	-442	-411	-402	-349	-361	-407	-351	-329	-306
- Capital Expenditures	4,517	4,653	4,779	4,901	5,005	5,115	5,218	5,316	5,408	5,494
FCFF	5,991	7,133	7,556	7,745	7,864	8,261	8,523	8,631	8,763	8,870
Growth		19.1%	5.9%	2.5%	1.5%	5.0%	3.2%	1.3%	1.5%	1.2%

Table 15: FCFF Computation

The FCFF is increasing over the explicit period as it is directly connected to the revenues which are also assumed to increase during the explicit period. In the years 2025 – 2028 the growth of the FCFF is slowing down and stabilises to reach a steady state in 2028.

Based on the FCFF the present value was obtained by discounting the FCFF at the WACC and summing up the single years as presented in table 16. After the explicit period, Carlsberg is expected to grow at a stable rate of 1.20%. This growth rate seems reasonable based on the growth expectations of the company and also the growth of the FCFF in the last three years of the explicit period is close to this value. In addition, the chosen growth rate stays at a level below the nominal GDP growth as the company cannot grow more than the economy as a whole. The terminal value was calculated according to equation [21] based on the FCFF in 2028 and the perpetual growth rate.

The total Enterprise Value amounts to DKK 147,074 million which was calculated by summing up the total PV FCFF and the PV of the terminal value. To obtain the Equity Value the net debt and the non-controlling interests are deducted from the Enterprise Value. The net debt was determined by deduction the cash and cash equivalents from the market value of debt. The non-controlling interests are ownership positions where Carlsberg owns less than 50% in companies.

The result is an Equity Value of DKK 126,093 million. Finally, this value is divided by the number of shares outstanding, resulting in a target price of DKK 826.51 per share.

Target Price Computation	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Time Period	1	2	3	4	5	6	7	8	9	10
WACC	6.47%	6.47%	6.47%	6.47%	6.47%	6.47%	6.47%	6.47%	6.47%	6.47%
PV FCFF	5,627	6,293	6,261	6,027	5,748	5,671	5,495	5,227	4,984	4,739
Total PV FCFF										56,072
Perpetual growth rate										1.20%
Terminal Value										170,340
PV Terminal Value										91,002
Total Enterprise Value										**147,074**
- net Debt										18,394
- Non-Controlling Interests										2,587
Equity Value										**126,093**
Shares Outstanding										152.56
Value per Share (DKK)										**826.51**
Current Share Price (DKK)										794.6
Upside Potential										4.0%

Table 16: Target Price Computation

Table 16 shows that the obtained value per share incorporates an upside potential of 4.0% compared to the current share price of B Shares (DKK 794.6) as all free float shares are B shares. Based on this, a neutral (Hold) investment recommendation is given.

5.2 Sensitivity Analysis

In the following a sensitivity analysis is performed to test the impact of changes in the input variables on the share price. Two important variables are the discount rate and the perpetual growth rate.

The perpetual growth rate impacts the terminal value and thus the valuation outcome. In the DCF Valuation presented above, the terminal value accounts for 62% of the EV. The WACC is the discount rate at which the free-cash-flows and the terminal value are discounted. Thus, also this parameter is crucial in determining the share price.

The sensitivity analysis presented in table 17 was performed using two-dimensional data tables.

		Perpetuity Growth Rate						
		0.00%	0.40%	0.80%	**1.20%**	1.60%	2.00%	2.40%
	5.27%	893.88	950.96	1,018.26	1,098.78	1,196.85	1,318.92	1,475.01
	5.67%	823.19	870.57	925.73	990.76	1,068.58	1,163.37	1,281.34
	6.07%	762.56	802.32	848.11	901.43	964.29	1,039.51	1,131.12
WACC	**6.47%**	710.10	743.78	782.22	**826.51**	878.03	938.80	1,011.51
	6.87%	664.36	693.14	725.70	762.86	805.66	855.50	914.25
	7.27%	624.21	648.97	676.80	708.29	744.22	785.60	833.79
	7.67%	588.76	610.20	634.15	661.05	691.51	726.25	766.28

Table 17: Sensitivity Analysis

The results obtained show that changes in the input variables truly influence the share price of Carlsberg. As the results represent the share price is more sensitive to changes in the WACC. Keeping the perpetual growth rate stable at 1.20% the resulting range of share prices ranges from DKK 661.05 to DKK 1,098.78. In contrast, while keeping the WACC constant at 6.47% the achieved share prices fall into the range between DKK 710.10 to DKK 1,011.51.

By changing both dimensions, the worst-case scenario results in a share price of DKK 588.76, whereas the best-case scenario achieved a price of DKK 1,475.01. However, it is important to consider that the presented results display very pessimistic and optimistic views. Further, these

scenarios are unlikely to happen as the values of the modified parameters are far from the best estimates in the DCF valuation. The currently used growth rate and WACC in performed DCF Valuation are the ones that are expected to represent best the current and future perspectives of Carlsberg.

5.3 Relative Valuation

In addition to the DCF Valuation a relative valuation was performed to compare the share price obtained through the DCF with the share price based on the ratios of comparable firms.

5.3.1 Peer Group

The selection of the peer group is crucial for the relative valuation and the peers should be similar to the company being valued in terms of risk, growth and cash-flows. Further, some researches recommend, that the peers should operate in the same industry as this incorporates sharing the same set of macroeconomic conditions.

Based on these characteristics, the selection of the peers was restricted to the beverages industry. To identify possible peers of Carlsberg the data from the industry reports such as MarketLine and Capital IQ were taken into consideration. The companies within the industry are very different as the three-dimensional diagrams illustrate.

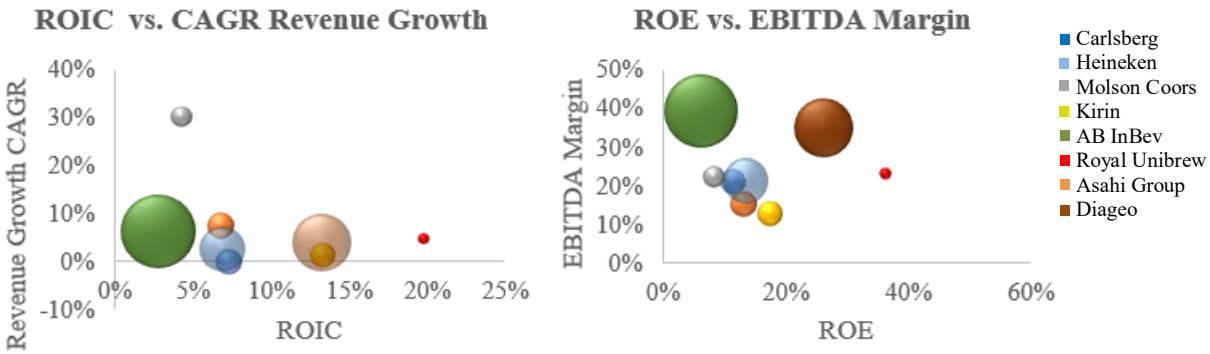


Figure 22: Comparison possible Peers regarding different Characteristics

For the first selection the operating markets were observed. Companies that are not operating internationally, more specifically companies that are only operating regionally or sell their products in a limited number of markets were eliminated as Carlsberg is a multinational company selling their products worldwide.

For the further analysis a cluster analysis was conducted using three clusters and five different variables, namely revenue growth, ROE, ROIC, EBITDA margin and market capitalisation.

The ROE, ROIC and the EBITDA margin are indicators reflecting the cash-flow. The revenue growth ensures that the peers are growing at similar rates as Carlsberg.

The afterwards performed cluster analysis standardizes the values of the different variables of the peers by the use of z-scores and finally allocates the companies to a cluster through the computation of the minimum distance between the five variables. The final peer group contains four different companies as presented in the following table.

Peers	Market Cap*	EBITDA	ROE	ROIC	Sales Growth 2 Years	Sales Growth 1 Year
Anheuser-Busch InBev N.V.	143,544	39.50%	6.20%	2.80%	6.26%	-4.39%
Asahi Group Holdings, Ltd.	17,499	15.30%	13.20%	6.80%	7.50%	-1.87%
Molson Coors Brewing Company	11,153	22.40%	8.40%	4.30%	30.15%	3.99%
Heineken N.V.	54,007	21.30%	13.56%	6.90%	2.62%	-1.32%
Carlsberg A/S	**17,622**	**21.10%**	**11.50%**	**7.30%**	**-0.06%**	**3.05%**

Table 18: Peer Group achieved through a Cluster Analysis

*in Million Euro

By analysing the achieved peer group, Anheuser-Busch InBev is larger than all the other peers. However, the business model and the operating markets of InBev are quite similar to the ones of Carlsberg.

5.3.2 Multiples

After selecting the peer group, the multiples for each peer were extracted from Capital IQ. For the relative valuation forward-looking multiples are selected as they are perceived to display the future prospects better than historical multiples. Further, the valuation was conducted by using EV/EBITDA and EV/EBIT multiples as these are the most common multiples. Further, EV/Sales was selected to compare the similarities in terms of revenues and lastly the pricing multiples PER and P/Sales were taken into consideration.

The multiple of the peer group used to value Carlsberg was calculated using the harmonic mean as it mitigates the effect of outliers. Then, this ratio was multiplied with the respective value driver to reach the EV.

Relative Valuation	EV/EBITDA	EV/EBIT	EV/Sales	PER	P/Sales
Multiple (harmonic mean)	10.5	14.5	2.3	15.4	1.5
Enterprise Value	141,231.40	135,080.88	146,814.21	81,516.47	95,488.60
Equity Value	120,250.40	114,099.88	125,833.21	81,516.47	95,488.60
Share Price	**788.22**	**747.90**	**824.81**	**534.32**	**625.91**

Table 19: Relative Valuation using Enterprise and Price Multiples

The target prices obtained through the relative valuation vary significantly based on the chosen multiple. A price range from DKK 625.91 to DKK 824.81 was reached. In general, price multiples return lower results than enterprise multiples. The enterprise multiples are closer to the current share price (DKK 794.6). EV/Sales is the multiple that achieves the highest share price which could be caused by operational differences among the peers.

The most common multiples EV/EBITDA and EV/EBIT differ in the consideration of D&A. The peers have different assets in their Balance Sheets and also obligated to fulfil different accounting rules. Therefore, the EV/EBITDA is seen as the most accurate multiple. Consequently, a hold recommendation is considered as appropriate. This is also in accordance with the result obtained through the DCF valuation as the football field in figure 23 illustrates.

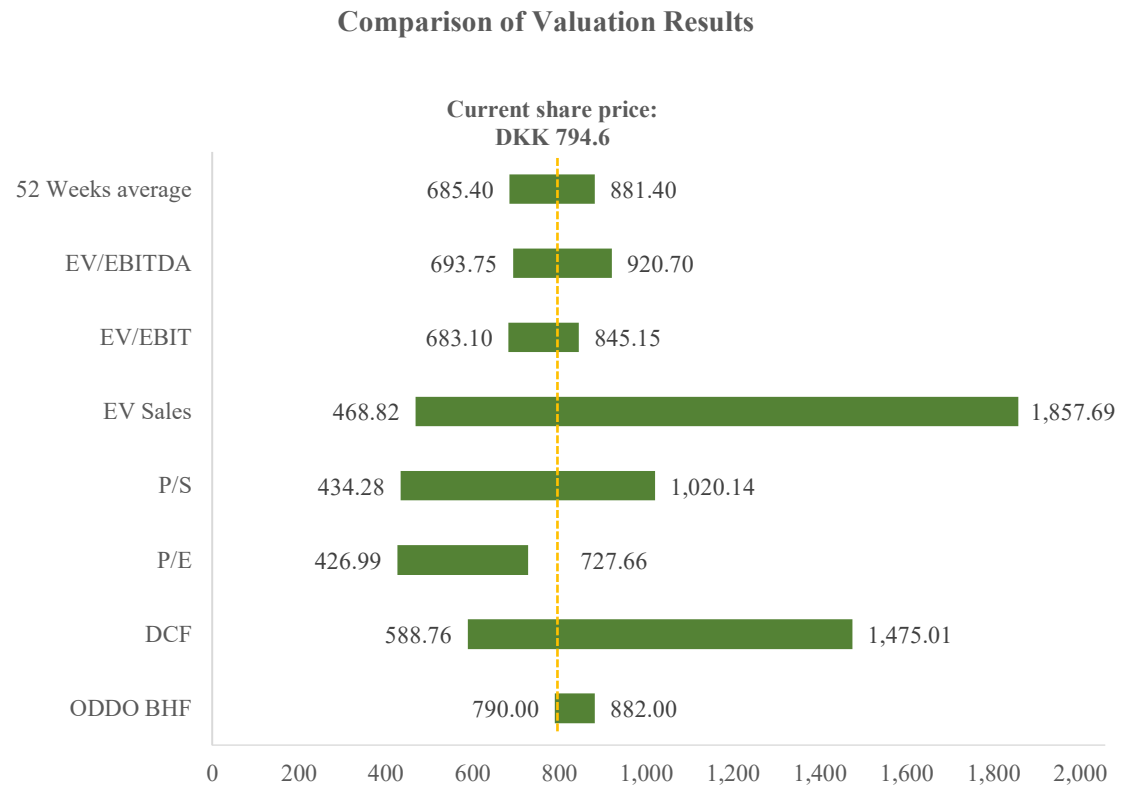


Figure 23: Comparing Valuation Results via a Football Field

6 Equity Report Comparison

In this section the valuation results achieved through the DCF and the relative valuation as well as the underlying assumption are compared with the equity report of ODDO BHF published on the 02nd of February, 2019.

Equal to the valuation in this dissertation, also ODDO BHF used a DCF valuation and a relative valuation in order to obtain the share price. The target price achieved by ODDO BHF of DKK 816.00 is the arithmetic mean of the their DCF and the multiples valuation. In contrast, the target price presented above is based on the DCF valuation resulting in DKK 826.51 as this is assumed to be the accurate approach to determine the fair value. The multiples valuation in this dissertation was used as a complementary method to the DCF model. Despite these differences, the target prices are quite similar, resulting both in a hold recommendation.

The DCF valuation of ODDO BHF is based on an explicit period of 11-years, whereas this dissertation uses 10-years of explicit period. The sales, as figures 24 illustrates, are very similar. Till 2021 the net sales of ODDO BHF are slightly less pessimistic, whereas in the rest of the explicit period their forecast is slightly more optimistic than the forecasts presented above.

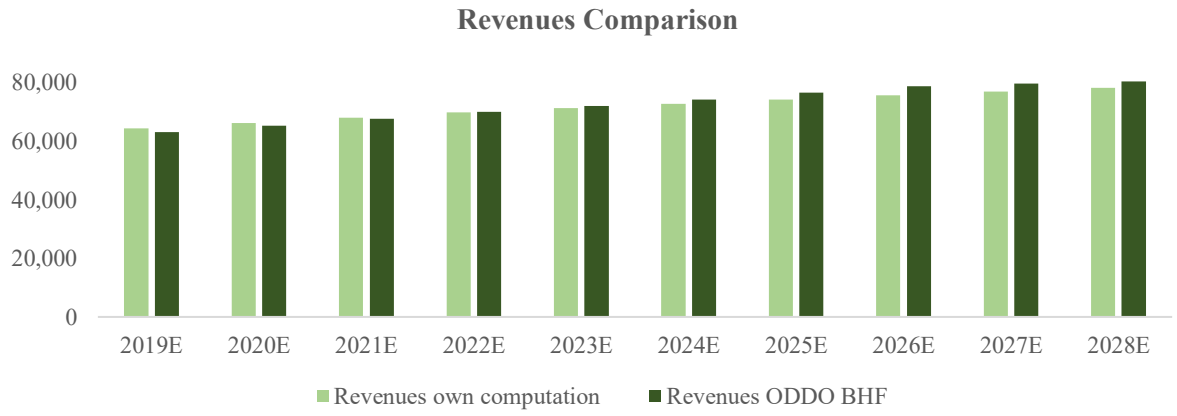


Figure 24: Revenue Comparison

Comparing the EBIT and the EBIT margin, the investment bank reached a higher EBIT and thus also higher EBIT margins. The differences even increase at the end of the explicit period. The main reason for this is that ODDO BHF included higher D&A expenses and lower operating expenses in their calculations.

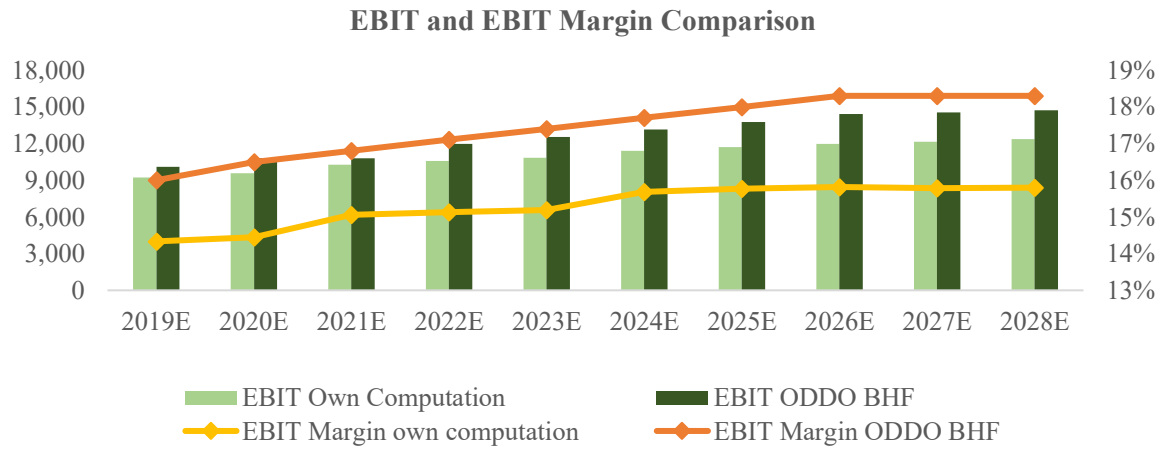


Figure 25: Comparison EBIT and EBIT Margin

The tax expenses also differ as they depend on the EBIT and further the investment bank calculated the tax expense with a tax rate of 28% compared to 27% in the dissertation.

Regarding CapEx, ODDO BHF assumed a constant rate of 6.6% of their revenues over the explicit period. The D&A was also calculated as a constant rate of revenues amounting to 7.34%. Thus, the ratio of CapEx/D&A stays constant at 0.896. In this dissertation the CapEx is assumed to be higher based on the company's assumptions for higher investments in 2019 related to Sail'22, resulting in a higher CapEx/D&A ratio.

The changes in WC capital are also different. ODDO BHF assumes the working capital to increase, resulting in positive increasing changes. In contrast, this report assumes a decreasing WC with a slower decrease at the end of the explicit period.

Figure 26 presents the free-cash flows of the DCF valuations, which are higher for ODDO BHF due to the reasons previously explained.

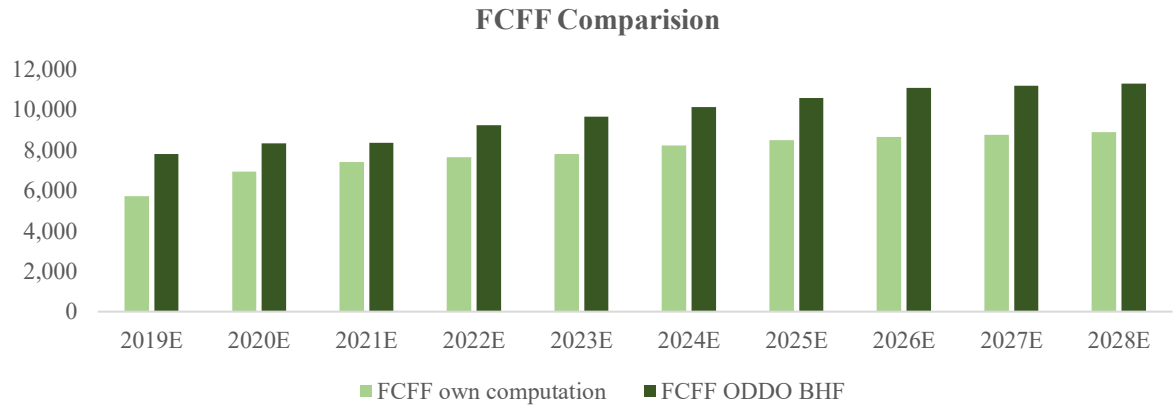


Figure 26: FCFF Comparison

Another important parameter in obtaining the target price is the WACC calculation displayed in table 20. The cost of equity computed by ODDO BHF is slightly higher. This is mainly caused by a higher equity risk premium and a higher beta as the risk-free rate is nearly equal. The cost of debt used in the dissertation is higher compared to the investment bank due to the lower spread they assumed. Further, the target capital structure differs slightly, whereby the amount of debt calculated by the investment bank is lower as assumed in this report. All this leads to a higher WACC calculated by ODDO BHF than the one presented above.

WACC Computation ODDO BHF

Risk-free rate	0.23%	Cost of Equity	8.30%	Cost of Debt	0.80%
E/V	86.06%	MRP	8.96%	Tax rate	28.00%
D/V	13.94%	Beta	0.90	Spread	0.94%
WACC	**7.30%**				

Table 20: WACC Computation ODDO BHF

The investment bank computed the terminal value based on a perpetual growth rate of 1.0%, whereas in this dissertation a slightly higher rate of 1.20% was assumed.

The multiples valuation performed by ODDO BHF was based on forward-looking multiples relating to the year 2020. The multiples they used are the P/E, EV/EBIT and the EV/EBITDA which are similar to the ones used in the dissertation. However, the peer group of the investment bank was smaller, including only Carlsberg's biggest competitors AB InBev and Heineken.

7 Conclusion

The purpose of this dissertation was to determine the share price of Carlsberg A/S. In order to reach this purpose, the different valuation models were examined in the literature review, concluding that the WACC-based DCF model was the most appropriate one to estimate the fair value of Carlsberg. To verify the plausibility and reliability of the obtained result a relative valuation was performed.

During the thesis the industry and the historical performance of Carlsberg were carefully analysed to identify potential risks and growth potentials. The financial forecasts, necessary for the DCF valuation, were based on the best assumptions and estimates regarding the company's future. The strategy of the company and the industry perspectives show that Carlsberg's is able to grow at a low to medium growth rate. Thus, based on the DCF valuation results, Carlsberg's stock is fairly priced and the current share price is close to the target price, with an upside potential of 4.0%.

Still, it is important to bear in mind, that the relative valuation revealed different results depending on the multiple used. Mostly the results achieved by the relative valuation are lower than the target price obtained through the DCF. Finally, it was concluded that the EV/EBITDA is the appropriate multiple to which the DCF results were compared. Due to the limitations of the relative valuation, the share price obtained by the DCF approach was considered as the final target price.

In addition, the sensitivity of the DCF valuation model was tested regarding the WACC and the perpetuity growth rate. Both parameters have a substantial impact on the share price. Finally, the valuation results were compared with the investment report of ODDO BHF. Despite different assumptions and valuation parameters the target prices are fairly similar.

8 Appendices

Appendix 1: Interest Tax Shield and Expected Bankruptcy Costs

Following the interest tax shield and the expected bankruptcy costs are elaborated as these are important parameters in the APV calculation.

Interest Tax Shield

One benefit of using debt to finance the company's operations is that the interest paid on debt is tax deductible and thus reducing the taxable income. Therefore, the Interest tax shield (ITS) is added to the company's value. However, debt financing, also comes with costs as financial distress costs. Hence, a company should carefully evaluate the level of debt it takes to finance its operations.
In order to compute the interest tax shield there are three major issues to deal with. First, the question about the appropriate tax rate. Second, if the value of debt is based on the book value or the fair value and third, the selection of the rate of return to discount the ITS (Damodaran, 2006).

The interest tax shield is an important parameter for the APV computation. According to Myers (1974) who introduced the APV, the ITS should be discounted with the cost of debt as the risk of the tax savings is equal to the risk of taking debt.

$$PVITS = PV\ [D * T * K_d; K_d]$$

In 1994, Damodaran argued that all the business risk comes from equity and thus he relates the levered beta to the asset beta assuming a debt beta of zero, resulting in the following approach to calculate the ITS:

$$PVITS = [D * T * K_u – D\ (K_d\text{-}r_f)\ (1\text{-}T); K_u]$$

Similarly, Fernandez (2004) claims, that "the value of tax shields for perpetuities is equal to the tax rate times the value of debt" and for constant growth companies the present value of tax shields is discounted at the unlevered cost of equity:

$$PVITS = PV\ [D * T * K_u; K_u]$$

In contrast to Fernández, Cooper and Nyborg (2006) state that "the value of the debt tax savings is the present value of the tax savings from interest" discounted at the K_u:

$$PVITS = PV\ [D * K_d * T; K_u]$$

A different perspective is presented by Koller et al. (2010). They argue that the capital structure is important in order to determine the discount rate. If the company's debt is growing, the tax shield should be discounted at the unlevered cost of equity yielding the same risk as the operating assets. Otherwise, if the debt is not growing the appropriate discount rate is the cost of debt.

Expected bankruptcy costs

Another important component of the APV approach is the expected bankruptcy cost. The expected bankruptcy costs are the company's costs of carrying debt on the balance sheet, increasing the probability of default and bankruptcy. The estimation of the bankruptcy costs is a significant problem in the APV calculation (Damodaran, 2006).

The expected bankruptcy costs are calculated in the following way:

PV of expected bankruptcy costs = Probability of bankruptcy * PV of bankruptcy costs

The bankruptcy costs are composed of the direct and indirect bankruptcy costs. The direct costs are relatively small, accounting for around 3%-5% of the company's value at the time of distress including for instance legal, management and auditors' fees. The indirect bankruptcy costs such as the loss of suppliers or key employees account for 10% -15% of the firms value and are difficult to estimate (Damodaran, 2006).

According to Damodaran (2006) the probability of default can be estimated either by estimating a bond rating or by using a statistical approach.

Appendix 2: Liquidation and Accounting Valuation

The liquidation and accounting based valuation are two techniques of estimating the value of a company based on the valuation of individual assets and adding them up to receive the value of the business (Damodaran, 2006).

In this context, Damodaran (2006) distinguishes between several variants of asset-based valuation models. The most common one, is the residual income model which is an earnings-based model composed of the book value of equity, earnings and dividends within one period. The residual income model "only provides minor improvements compared to the dividend discount model (Dechow, Hutton, & Sloan, 1999).

Another variant of asset-based valuation is the liquidation model which estimates the value of the company by assuming that the company is currently liquidated. The liquidation model is appropriate for companies in financial distress, but for an underlying going concern assumption, the model is too conservative (Damodaran, 2006).

As the company value of Carlsberg depends widely on growth assets and the business is expected to continue its operations in the future this analysis is not performed.

Appendix 3: Contingent Claim Valuation

The contingent claim or option pricing valuation models, estimate the company's value by calculating the fair value of the option. Option pricing models are "used to value investment opportunities in real markets" (Keith & Michaels, 1997, p. 6). Thus, for companies facing a high uncertainty in their investment decisions and consequently need a high degree of flexibility to process new information, option pricing models are the appropriate valuation tool. By the use of these models, all the possible scenarios a company might face in multistage investment decisions are taken into consideration (Copeland & Keenan, 1998).

The most used option pricing models to value options are the Black-Scholes and the Binominal Model, which estimate the value of the option by replicating the portfolio based on the risk-free rate and the underlying asset (Fernández, 2002). If applied correctly, these models are powerful valuation tools. However, due to the "high volatility of the sources of uncertainty" (Fernández, 2002, p. 1) it is difficult to correctly estimate the input parameters and thus to value the options and estimate the companies value (Fernández, 2002). Further, Luehrman (1997) states that option pricing methods are less intuitive and require more time to learn which makes them more expensive compared to other valuation methods.

For the valuation of Carlsberg, option pricing models are not considered due to the lack of applicability for this company as the information provided is not sufficient for using this method.

Appendix 4: History of Carlsberg

In 1847 Carlsberg was founded by J.C. Jacobsen near Copenhagen to produce beer. A few year later in 1868 the first barrel of beer was exported Edinburgh in Scotland (Carlsberg, 2019f).

To ensure continuous innovation and high-quality J.C. Jacobsen established the Carlsberg Research Laboratory in 1875. Important discoveries as the purification of yeast, the pH scale or the role of the enzymes allowed Carlsberg to continuously improve its brewing process and beer quality. Today, the research focus is on flavour stability and the lower consumption of water and energy with in the brewing process (Carlsberg, 2019b).. Besides, the laboratory researches in the field of breeding malt and yeast as well as in the usage of new natural ingredients to flavour beers and malt products (Carlsberg, 2019g). One year later in 1876 the Carlsberg Foundation was founded supporting the work of the Laboratory (Carlsberg, 2019f).

After discrepancies, Carl, the son of J.C. Jacobsen established a brewery named New Carlsberg in 1882. In 1886 J.C. Jacobson died. Three years later Carlsberg exported for the first-time beer to Asia. In 1904 the company started with the brewing of Carlsberg pilsner. Soon after, in 1906 the old and the new Carlsberg merged to Carlsberg Breweries. After that, the an eight-hour working day was introduced and with the help of researches the pH Scale was developed in 1909.

In the 1900s Carlsberg grew his export and expansion to various countries. Between 1968-1981 Carlsberg started opening breweries in Europe and Asia and thus increasing its international focus. In 1970 “Carlsberg was listed on the Copenhagen Stock Exchange” (Carlsberg, 2019f) and three years later in 1973 the tagline “Probably the best beer in the world” was established. In 1976 the success of the brands Carlsberg and Tuborg exceeded the domestic sales (Carlsberg, 2019f).

Recent developments of Carlsberg contain the sustainability concept ‘together towards zero’ launched in 2017 and the development of the snap pack to reduce plastic waste in 2018 (Carlsberg, 2019f).

Appendix 5: Share Classes of Carlsberg

Share Information	A Shares	B Shares	Total
Number of Shares	33,699,252	118,857,554	152,556,806
Carlsberg Foundation	33,061,264	13,202,708	46,263,972
Votes per Share	20	2	
Par Value	DKK 20	DKK 20	
Shares Price 28.02.2019	DKK 774	DKK 794.6	
Dividend per Share 2018	DKK 18	DKK 18	

Appendix 6: Operating Markets of Carlsberg

Western Europe: France, Denmark, Sweden, Norway, Finland, Switzerland, Portugal and Germany, Poland, the UK, Italy, Estonia, Latvia, Lithuania, Bulgaria, Croatia, Serbia, The Baltics and Greece

Eastern Europe: Russia, Ukraine, Belarus, Kazakhstan, and Azerbaijan

Asia: Cambodia, China, Hong Kong, India, Laos, Myanmar, Malaysia, Nepal, Singapore, and Vietnam

Appendix 7: SWOT Analysis

Strength ▪ Carlsberg has a strong presence in Western Europe. ▪ Carlsberg has a strong regional presence and brand portfolio in its operating markets (#1 and #2 positions in all three regions) ▪ The company focuses on product innovation, sustainability and environmental protection ▪ Strong and diversified product portfolio of local, international and speciality beers	**Weaknesses** ▪ Low market presence in emerging markets, Africa, South and Northern America ▪ High dependency on international brands Carlsberg and Tuborg
Opportunities ▪ The consumption of soft drinks and alcohol-free beverages is growing ▪ For the next years there is a positive outlook of the global beer market ▪ Carlsberg is extending its market share in the Asian beer market which has a high growth potential ▪ Extension of market presence in emerging markets through M&A	**Threats** ▪ Healthy lifestyle is emerging, which increases the health awareness of customers, thus it is likely that beer will be negatively associated with this lifestyle ▪ Strict advertising regulations in some countries in which Carlsberg is operating e.g. Russia ▪ High competition in all markets ▪ Uncertainty regarding political issues like the Brexit or the Trump government increasing foreign currency risks

Source: (Carlsberg, 2016; MarketLine, 2018a)

Appendix 8: Segmentation of Volume by Region

As the total revenues, also the total beverages volume declined in the period of 2014-2018. The beer volume experienced a decline in the last five years, whereas the volume of the other beverage grew or stayed stable in all three regions.

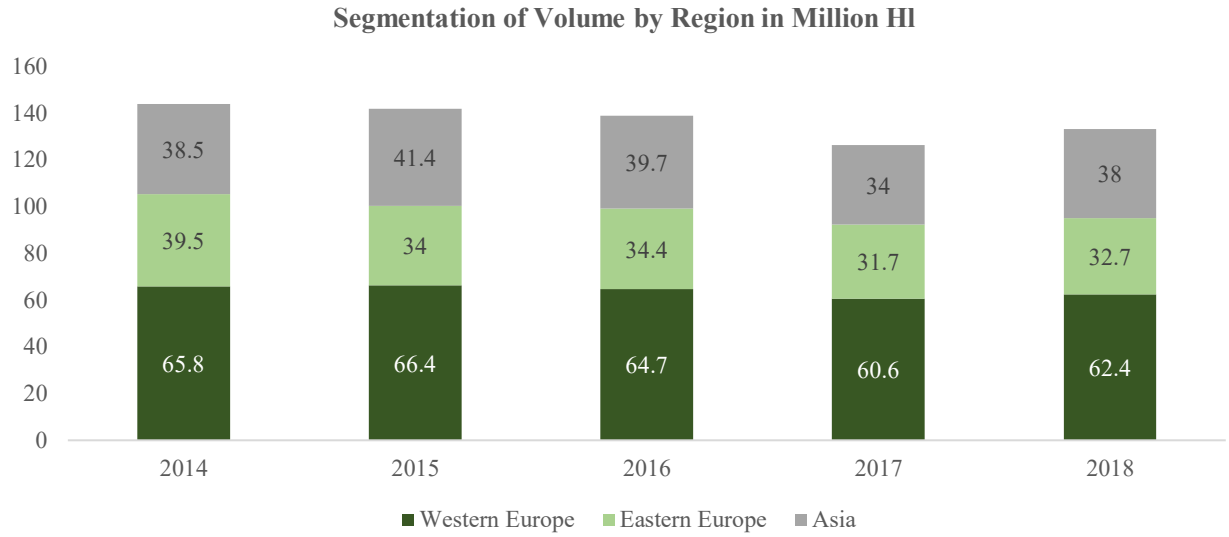


Figure 27: Segmentation of Volume by Region

Appendix 9: Ratio Analysis

	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Return on equity											
Return on equity	7.9%	-6.0%	8.4%	2.8%	11.1%	12.5%	12.1%	12.7%	12.6%	12.4%	12.6%
Traditional decomposition of ROE											
Net profit margin (ROS)	6.9%	-4.4%	7.2%	2.3%	8.5%	9.0%	8.5%	8.9%	8.9%	9.0%	9.2%
× Asset turnover	0.47	0.52	0.49	0.53	0.53	0.55	0.55	0.56	0.55	0.55	0.55
= Return on assets (ROA)	3.2%	-2.3%	3.5%	1.2%	4.5%	5.0%	4.7%	4.9%	4.9%	4.9%	5.1%
× Equity multiplier	2.45	2.64	2.37	2.31	2.46	2.51	2.56	2.57	2.55	2.51	2.49
= Return on equity (ROE)	7.9%	-6.0%	8.4%	2.8%	11.1%	12.5%	12.1%	12.7%	12.6%	12.4%	12.6%
Common-sized income statement and profitability ratios											
Line items as a percent of revenue											
Revenue	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Net operating expense	-86.3%	-87.5%	-87.3%	-85.6%	-85.2%	-85.8%	-85.7%	-85.2%	-85.2%	-85.1%	-84.7%
Other income/expense	-2.1%	-13.2%	0.4%	-7.5%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Net operating profit before tax	11.6%	-0.7%	13.1%	6.9%	14.6%	14.2%	14.3%	14.8%	14.8%	14.9%	15.3%
Investment income	0.6%	0.6%	0.5%	0.4%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Interest income	1.2%	0.7%	1.5%	0.8%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Interest expense	-3.1%	-3.1%	-3.5%	-2.1%	-1.7%	-1.1%	-1.9%	-1.9%	-1.9%	-1.8%	-1.8%
Tax expense	-2.7%	-1.3%	-3.8%	-2.4%	-3.8%	-3.8%	-3.6%	-3.8%	-3.8%	-3.8%	-3.9%
Profit/loss (incl. NCI)	7.7%	-3.8%	7.8%	3.6%	9.9%	10.0%	9.4%	9.9%	9.9%	9.9%	10.2%
Profit/loss (excl. NCI)	6.9%	-4.4%	7.2%	2.3%	8.5%	9.0%	8.5%	8.9%	8.9%	9.0%	9.2%
Operating expense line items as a percent of revenue (by function)											
Cost of sales	-46.3%	-46.4%	-44.6%	-44.8%	-45.5%	-44.9%	-44.8%	-44.7%	-44.7%	-44.7%	-44.7%
Selling, admin. expense	-34.3%	-34.3%	-35.5%	-33.4%	-33.4%	-34.3%	-34.3%	-33.8%	-33.8%	-33.8%	-33.4%
Key profitability ratios											
Gross profit margin	53.7%	53.6%	55.4%	55.2%	54.5%	55.1%	55.2%	55.3%	55.3%	55.3%	55.3%
EBITDA margin	20.7%	20.2%	20.8%	22.4%	21.5%	21.1%	21.2%	21.7%	21.8%	21.8%	22.2%
EBIT margin	14.3%	12.9%	13.2%	14.6%	14.9%	14.3%	14.3%	14.9%	14.9%	15.0%	15.4%
NOPLAT margin	10.6%	6.6%	8.8%	8.6%	10.7%	10.4%	10.5%	10.9%	10.9%	10.9%	11.2%
Net profit margin	6.9%	-4.4%	7.2%	2.3%	8.5%	9.0%	8.5%	8.9%	8.9%	9.0%	9.2%
Asset management ratios											
Operating working capital/Revenue	-6.3%	-11.4%	-11.3%	-14.0%	-17.3%	-15.3%	-15.2%	-15.0%	-14.9%	-14.8%	-14.7%
Net non-current assets/Revenue	172.6%	151.1%	159.9%	148.5%	144.9%	135.3%	136.0%	135.2%	136.1%	137.0%	138.3%
PP&E/Revenue	45.2%	40.8%	41.2%	40.1%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%	40.6%
Operating working capital turnover	-15.75	-8.81	-8.64	-7.79	-6.49	-6.24	-6.66	-6.72	-6.77	-6.80	-6.84
PP&E turnover	2.21	2.45	2.43	2.49	2.46	2.46	2.46	2.46	2.46	2.46	2.46
Trade receivables turnover	9.42	11.41	11.42	13.15	12.29	12.86	12.86	12.86	12.86	12.86	12.86
Days' receivables	38	35	32	30	28	28	28	28	28	28	28
Inventories turnover	6.95	7.95	7.05	7.09	6.41	6.80	6.81	6.82	6.82	6.82	6.84
Days' inventories	47	44	45	46	48	48	48	48	48	48	48
Trade payables turnover	2.48	2.47	2.17	2.02	1.92	1.84	1.94	1.94	1.94	1.93	1.94
Days' payables	133	131	149	159	171	171	171	171	171	171	171
Liquidity ratios											
Current ratio	65.2%	56.0%	49.4%	60.8%	52.5%	42.0%	43.4%	42.3%	44.3%	46.2%	49.2%
Quick ratio	34.9%	29.9%	26.3%	32.2%	31.0%	20.3%	21.5%	20.3%	22.2%	24.0%	26.9%
Cash ratio	9.1%	10.6%	10.3%	13.8%	16.2%	5.3%	6.4%	5.1%	6.8%	8.5%	11.3%
Debt and coverage ratios											
Liabilities-to-equity	1.45	1.64	1.37	1.31	1.46	1.51	1.56	1.57	1.55	1.51	1.49
Debt-to-equity (Book Values)	0.72	0.76	0.56	0.49	0.50	0.58	0.62	0.62	0.62	0.60	0.60
Debt-to-capital (Book Values)	0.42	0.43	0.36	0.33	0.33	0.37	0.38	0.38	0.38	0.38	0.38
Interest coverage (earnings based)	2.99	-2.76	3.10	1.82	6.86	10.89	6.17	6.54	6.59	6.71	6.92
Sustainable growth rate											
ROE	7.9%	-6.0%	8.4%	2.8%	11.1%	12.5%	12.1%	12.7%	12.6%	12.4%	12.6%
Dividend payout ratio	33.1%	-73.0%	41.0%	109.6%	53.9%	55.1%	54.9%	54.9%	54.9%	54.9%	54.9%
Dividend payout ratio adjusted	26.0%	31.0%	43.2%	34.1%	53.2%	55.1%	54.9%	54.9%	54.9%	54.9%	54.9%

Appendix 10: Revenue Forecast by Region and Total Revenue Forecast

In this appendix the underlying assumptions for the revenue forecasts are presented. This includes the industry and the GDP growth rates for the respective regions which resulted in the organic growth rates for the respective region displayed in section 6.1.1.1. Further, the total forecast of the intra-segment revenues, the total forecasted revenues and the respective growth rates are shown in the second table. The last four years of the total revenues are not divided into the different regions.

Growth Rates	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Western Europe											
GDP Growth	1.7%	2.2%	1.9%	2.3%	1.8%	1.2%	1.5%	1.5%	1.5%	1.4%	1.4%
Industry Growth Revenue	5.4%	1.7%	2.2%	2.9%	3.7%	1.7%	2.5%	2.1%	2.3%		
Industry Growth Beer	-0.4%	-0.9%	0.3%	-0.7%	0.9%	0.2%	0.0%	-0.2%	-0.1%		
Industry Growth Other Beverages	1.6%	1.6%	1.6%	1.6%	1.6%	1.9%	1.9%	1.9%	1.9%		
Eastern Europe											
GDP Growth	1.2%	-0.4%	1.5%	2.9%	3.2%	2.4%	2.3%	2.2%	2.2%	2.2%	2.2%
Industry Growth Revenue	5.4%	1.7%	2.2%	2.9%	3.7%	1.7%	2.5%	2.1%	2.3%		
Industry Growth Beer	-0.4%	-0.9%	0.3%	-0.7%	0.9%	0.2%	0.0%	-0.2%	-0.1%		
Industry Growth Other Beverages	1.6%	1.6%	1.6%	1.6%	1.6%	1.9%	1.9%	1.9%	1.9%		
Asia											
GDP Growth	5.6%	5.6%	5.4%	5.8%	5.3%	5.1%	5.2%	5.3%	5.2%	5.2%	5.2%
Industry Growth Revenue	7.3%	3.2%	2.5%	2.0%	5.8%	3.2%	4.5%	4.5%	4.8%		
Industry Growth Beer	-0.2%	-4.3%	-1.5%	0.4%	1.0%	0.9%	1.3%	1.2%	1.2%		
Industry Growth Other Beverages	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%		

(IMF, 2019; MarketLine, 2015; Statista, 2019)

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Total Revenue Regions	64,353	65,302	62,468	60,585	62,461	64,277	66,213	68,014	69,738	71,232	72,784	74,261	75,656	76,964	78,179
Growth		1.47%	-4.34%	-3.01%	3.10%	2.91%	3.01%	2.72%	2.54%	2.14%	2.18%	2.03%	1.88%	1.73%	1.58%
Intra-Segment Revenues	153.00	52.00	146.00	70.00	42.00	64.28	66.21	68.01	69.74	71.23	72.78	74.26	75.66	76.96	78.18
% of revenue	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Total Revenue	64,506	65,354	62,614	60,655	62,503	64,341	66,279	68,082	69,808	71,303	72,857	74,335	75,732	77,041	78,257
Growth		1.3%	-4.2%	-3.1%	3.0%	2.94%	3.01%	2.72%	2.54%	2.14%	2.18%	2.03%	1.88%	1.73%	1.58%

Appendix 11: Average Number of Employees

Below the percentage growth of the average number of employees and the total number of employees is displayed.

Employees	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Average number of employees	46,832	47,464	42,062	41,430	40,337	40,337	40,337	40,337	40,539	40,741	40,945	41,150	41,356	41,562	41,770
Growth		1.3%	-11.4%	-1.5%	-2.6%	0.0%	0.0%	0.0%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%

Appendix 12: Forecast Capital Expenditures

In this appendix the Capital Expenditures are presented. The Capital expenditures is divided in to Investments in PPE and Intangible assets as well as other investments in PPE which are taken from the Cash-Flow Statement of Carlsberg. In addition, the ratio of CapEx/Depreciation is displayed

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Investments PPE, IA	5,888	4,069	3,820	4,053	4,017	4,504	4,640	4,766	4,887	4,991	5,100	5,203	5,301	5,393	5,478
% of Revenue	9.13%	6.23%	6.10%	6.68%	6.43%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%	7.00%
Other investments PPE	20	81	20	0	10	13	13	14	14	14	15	15	15	15	16
% of Revenue	0.03%	0.12%	0.03%	0.00%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
CapEx	5,908	4,150	3,840	4,053	4,027	4,517	4,653	4,779	4,901	5,005	5,115	5,218	5,316	5,408	5,494
% of Revenue	9.16%	6.35%	6.13%	6.68%	6.44%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%	7.02%
Total D&A	4,108	4,756	4,761	4,707	4,091	4,338	4,469	4,590	4,707	4,807	4,912	5,012	5,106	5,194	5,276
CapEx/D&A	1.44	0.87	0.81	0.86	0.98	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04

Appendix 13: Working Capital

In this appendix the forecast assumptions and the actual values of the single items of the working capital are presented. In addition, the total working capital and the changes in working capital are displayed. The bottom of the table presents the cash conversion cycle, incorporating DIO, DSO and DPO.

In DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Inventories	4,293	3,817	3,963	3,834	4,435	4,244	4,361	4,469	4,575	4,667	4,762	4,866	4,958	5,044	5,123
DIO	47	44	45	46	48	48	48	48	48	48	48	48	48	48	48
Trade receivables	6,851	5,729	5,485	4,611	5,084	5,004	5,155	5,295	5,430	5,546	5,667	5,782	5,890	5,992	6,087
DSO	38	35	32	30	28	28	28	28	28	28	28	28	28	28	28
Prepayments	949	1,074	1,137	1,026	840	1,018	1,047	1,073	1,098	1,120	1,143	1,168	1,190	1,210	1,230
% COGS	2.9%	3.2%	3.6%	3.4%	2.7%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Tax receiveables	196	324	278	181	213	213	213	213	213	213	213	213	213	213	213
Other receivables (excl. hedging)	2,609	2,532	2,488	1,804	1,813	1,787	1,841	1,891	1,939	1,981	2,024	2,065	2,104	2,140	2,174
Days other receivables	15	14	14	13	10	10	10	10	10	10	10	10	10	10	10
Trade payables	12,048	12,260	13,497	13,474	16,199	15,118	15,534	15,921	16,298	16,626	16,964	17,337	17,663	17,968	18,252
DPO	133	131	149	159	171	171	171	171	171	171	171	171	171	171	171
Deposits packaging materials	2,034	1,819	1,681	1,576	1,583	1,623	1,668	1,709	1,750	1,785	1,821	1,861	1,896	1,929	1,960
% COGS	6.2%	5.4%	5.4%	5.2%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%
Provisions	510	648	722	591	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Tax payables	796	601	935	931	878	878	878	878	878	878	878	878	878	878	878
Other liabilities (excl. hedging)	9,323	9,794	8,233	7,533	7,223	7,515	7,722	7,914	8,102	8,264	8,433	8,618	8,780	8,931	9,072
Days other liabilities	103	105	95	89	85	85	85	85	85	85	85	85	85	85	85
Net deferred tax assets	1,430	1,697	1,610	1,663	1,693	1,737	1,790	1,838	1,885	1,925	1,967	2,007	2,045	2,080	2,113
% of revenue	2.2%	2.6%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Net deferred tax liabilities	7,147	5,924	6,250	5,601	5,659	5,855	6,031	6,195	6,353	6,489	6,630	6,764	6,892	7,011	7,121
% of revenue	11.1%	9.1%	10.0%	9.2%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%	9.1%
Net working Capital	-15,530	-15,873	-16,357	-16,587	-18,564	-18,086	-18,528	-18,939	-19,341	-19,690	-20,051	-20,457	-20,809	-21,138	-21,444
Δ Operating Working Capital		-343	-484	-230	-1,977	478	-442	-411	-402	-349	-361	-407	-351	-329	-306
Cash conversion cycle	-47	-53	-71	-83	-95	-95	-95	-95	-95	-95	-95	-95	-95	-95	-95

Appendix 14: Rearranged and forecasted Income Statement

The Income Statement presented in the table below displays the summary of the forecasted items necessary in order to obtain the net profit. For valuation purposes the income statement was rearranged separating operating and non-operating items. Most of the items were already estimated in section 6.1.1. The remaining items include the financial income, the financial expenses and the portion of profit attributed to the non-controlling interests (NCI).

The net financing costs, are divided into interest income and expenses as well as other financial income and expenses. The interest income was predicted based on the short-term investments of Carlsberg. The short-term investments are included in the cash and cash equivalents which are used to close the balance sheet. In order to avoid circular references, the computation of interest income was based on the cash and cash equivalents of the previous year, respectively. The ratio used for the forecast is expected to remain equal to the ratio in 2018 over the explicit period.

The interest expenses result from the interests paid on debt. Therefore, interest expenses are predicted as percentage of the total interest-bearing debt, resulting in 2.4% which is anticipated to stay constant till 2028.

Other financial income and expenses include fair value adjustments of financial instruments, foreign exchange gains and losses, interest on plan assets and others. The interest on plan assets results from defined benefit plans and are thus closely linked to the retirement benefit obligation. The ratio used for the forecasting is estimated to stay constant on the level of 2018. Other financials also stay constant based on 2018's level and as it is impossible to estimate exchange gains or losses and fair value adjustments, these are assumed to be zero in the future.

Given their strategic goals for 2019, Carlsberg disclosed that the net financing costs in 2019 will reach DKK 700 – 750million. Given the estimations above, for 2019 the net financial account for DKK 731.40 million which is in line with the company's strategy.

Lastly, the portion of profit assigned to the non-controlling interests is predicted as percentage of the consolidated profit. As the share of profit varied in the last years an average of the last five years was taken and expected to stay constant over the explicit period.

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
Net Revenue	**64,506**	**65,354**	**62,614**	**60,655**	**62,503**	**64,341**	**66,279**	**68,082**	**69,808**	**71,303**	**72,857**
Cost of sales	-29,835	-30,341	-27,928	-27,184	-28,434	-28,863	-29,691	-30,461	-31,205	-31,850	-32,549
Gross profit	**31,781**	**31,925**	**31,419**	**60,655**	**62,503**	**93,204**	**95,971**	**98,543**	**101,013**	**103,153**	**105,406**
Sales and distribution expenses	-17,937	-18,290	-17,438	-16,164	-16,529	-17,629	-18,161	-18,314	-18,778	-19,181	-19,263
Administrative expenses	-4,173	-4,109	-4,764	-4,099	-4,318	-4,446	-4,580	-4,704	-4,824	-4,927	-5,056
Other operating activities, net	369	235	198	113	68	68	68	68	68	68	68
Share of profit after tax of Ass.& JV	408	364	324	262	130	130	130	130	130	130	130
EBITDA	**13,338**	**13,213**	**13,006**	**13,583**	**13,420**	**13,600**	**14,046**	**14,801**	**15,199**	**15,544**	**16,187**
Depreciation, Amortisation	-4,103	-4,674	-4,742	-4,581	-4,064	-4,338	-4,469	-4,590	-4,707	-4,807	-4,912
Impairment loss	-5	-82	-19	-126	-27	-65	-67	-69	-71	-72	-74
EBIT	**9,230**	**8,457**	**8,245**	**8,876**	**9,329**	**9,197**	**9,510**	**10,142**	**10,422**	**10,664**	**11,201**
Special items, net	-1,353	-8,659	251	-4,565	-88	0	0	0	0	0	0
Financial income	806	490	919	511	358	338	343	347	352	356	361
Financial expenses	-1,997	-2,021	-2,166	-1,299	-1,080	-731	-1,255	-1,269	-1,296	-1,304	-1,330
Profit before tax (EBT)	**6,686**	**-1,733**	**7,249**	**3,523**	**8,519**	**8,804**	**8,598**	**9,219**	**9,478**	**9,717**	**10,231**
Income tax	-1,748	-849	-2,392	-1,458	-2,386	-2,465	-2,408	-2,581	-2,654	-2,721	-2,865
Consolidated profit	**4,938**	**-2,582**	**4,857**	**2,065**	**6,133**	**6,339**	**6,191**	**6,638**	**6,825**	**6,996**	**7,366**
Non-controlling interests	-524	-344	-371	-806	-824	-589	-609	-649	-667	-682	-717
Net Profit (Shareholders in Calrsberg A/S)	**4,414**	**-2,926**	**4,486**	**1,259**	**5,309**	**5,750**	**5,582**	**5,989**	**6,157**	**6,313**	**6,650**

Appendix 15: Forecasted Balance Sheet

Similar to the presented Income statement also the Balance Sheet is forecasted for the next six years, including the periods 2019 – 2024. In the following the estimations of the remaining items, that are not already explained in section 6.1.1, are presented.

In the non-current assets, the investments in associates and joint ventures and the receivables need to be estimated. The receivables are based on revenues. As the ratio in 2017 and 2018 remained unchanged, it is assumed that they stay at the same ratio over the explicit period. The investments in associates and joint ventures are estimated to stay constant at the value of 2018 due to the fact that Carlsberg does not disclose any information about their future strategy.

In the last two years Carlsberg did not hold any the assets for sale or liabilities associated with assets held for sale. Hence, also for the explicit period it is assumed that Carlsberg will not hold any of these assets in their Balance Sheet.

The non-current liabilities that need to be estimated are the retirement benefit obligations, the provisions and other liabilities. Retirement benefit obligations are connected with the number of employees and it is assumed that in the long run, the obligations change with the number of employees.

Therefore, the average of the last five years average number of employees was used for the prediction of this position. The other non-current liabilities are estimated in relation to the non-controlling interest as their dependency is disclosed in the annual report. Consequently, the average ratio of the last five years of NCI, was taken to obtain the values for this item. The provisions are expected to stay at the level of 2018 as no other information was disclosed.

The equity of Carlsberg is composed of various elements. The reserves and the share capital are expected to stay equal to the value of 2018. The retained earnings and the non-controlling interests are calculated as presented in the following equations. The net profit less the dividends that are used in the equations are attributable to shareholders and NCI, respectively. In 2018, Carlsberg announced to start a 12-month share-buyback program, starting in February 2019. The share-buyback is treated in as an additional dividend the company distributes to their shareholders. Thus, the expected amount of share-buyback of DKK 4.5bn is deducted from the retained earnings in 2019.

$$\text{Retained Earnings}_t = \text{Retained Earnings}_{t-1} + \text{Net Profit}_t - \text{Dividends}_t$$

$$\text{NCI}_t = \text{NCI}_{t-1} + \text{Net profit}_t - \text{Dividends}_t$$

In the strategy proposal Sail'22 Carlsberg discloses the goal to sustain a dividend-pay-out ratio of around 50%, which was already achieved in 2018. As no further information is given, the pay-out ratio is estimated to stay at the 50% of the consolidated profit over the explicit period.

In the debt section of Carlsberg, the current debt is predicted to stay on the level of 2018 and remain constant till 2024. For the estimation of the non-current debt Carlsberg's target leverage ratio of below 2.0x was taken into account. The leverage ratio is calculated by dividing the net-interest bearing debt by the EBITDA.

Lastly, in order to close the books, the cash and cash equivalents which are included in the current assets are used to account for the differences between assets, liabilities and equity.

in DKK Million	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E
ASSETS											
Non-current assets											
Intangible assets	82,409	72,920	76,736	67,793	66,868	68,776	70,848	72,775	74,620	76,218	77,879
Property, Plant and equipment	29,173	26,678	25,810	24,325	25,394	26,122	26,909	27,641	28,342	28,949	29,580
Investments in A&JV	4,277	4,676	4,701	4,266	4,562	4,562	4,562	4,562	4,562	4,562	4,562
Receivables	2,130	1,854	1,071	952	1,097	1,072	1,105	1,135	1,163	1,188	1,214
Deferred tax assets	1,430	1,697	1,610	1,663	1,693	1,737	1,790	1,838	1,885	1,925	1,967
Total non-current assets	119,419	107,825	109,928	98,999	99,614	102,270	105,214	107,951	110,572	112,843	115,202
Current assets											
Inventories	4,293	3,817	3,963	3,834	4,435	4,244	4,361	4,469	4,575	4,667	4,762
Trade receivables	6,851	5,729	5,485	4,611	5,084	5,004	5,155	5,295	5,430	5,546	5,667
Tax receivables	196	324	278	181	213	213	213	213	213	213	213
Other receivables	2,609	2,532	2,488	2,138	1,925	1,787	1,841	1,891	1,939	1,981	2,024
Prepayments	949	1,074	1,137	1,026	840	1,018	1,047	1,073	1,098	1,120	1,143
Cash and cash equivalents	2,418	3,131	3,502	3,462	5,589	1,777	2,198	1,760	2,418	3,064	4,121
Total current assets	17,316	16,607	16,853	15,252	18,086	14,044	14,814	14,701	15,672	16,591	17,929
Assets held for sale	723	469	125	0	0	0	0	0	0	0	0
Total assets	137,458	124,901	126,906	114,251	117,700	116,314	120,028	122,652	126,244	129,434	133,131
EQUITY AND LIABILITIES											
Equity											
Share capital	3,051	3,051	3,051	3,051	3,051	3,051	3,051	3,051	3,051	3,051	3,051
Reserves	-31,006	-35,447	-29,501	-33,485	-36,837	-36,837	-36,837	-36,837	-36,837	-36,837	-36,837
Retained earnings	80,392	75,885	77,261	77,364	79,088	77,699	78,087	79,024	80,605	82,620	84,272
Equity, shareholders in Carlsberg S/A	52,437	43,489	50,811	46,930	45,302	43,913	44,301	45,238	46,819	48,834	50,486
Non-controlling interests	3,560	3,742	2,839	2,595	2,587	2,503	2,525	2,579	2,669	2,784	2,878
Total Equity	55,997	47,231	53,650	49,525	47,889	46,416	46,827	47,817	49,488	51,618	53,364
Non-current liabilities											
Borrowings	38,690.00	31,479.00	21,137.00	23,340.00	16,750.00	19,456.16	21,799.47	22,413.56	23,449.31	23,737.55	24,785.51
Retirement benefit oblig., similar oblig.	4,626.00	5,235.00	4,878.00	3,351.00	2,908.00	3,872.35	3,872.35	3,872.35	3,891.71	3,911.17	3,930.73
Deferred tax liabilities	7,147.00	5,924.00	6,250.00	5,601.00	5,659.00	5,855.01	6,031.43	6,195.45	6,352.52	6,488.59	6,629.97
Provisions	3,010.00	3,374.00	3,642.00	3,611.00	3,827.00	3,827.00	3,827.00	3,827.00	3,827.00	3,827.00	3,827.00
Other liabilities	1,442.00	1,899.00	3,199.00	3,757.00	6,186.00	3,419.81	3,536.23	3,771.05	3,875.33	3,965.31	4,164.89
Total non-current liabilities	54,915.00	47,911.00	39,106.00	39,660.00	35,330.00	36,430.34	39,066.49	40,079.40	41,395.89	41,929.63	43,338.10
Current liabilities											
Borrowings	1,835.00	4,549.00	9,067.00	849.00	7,233.00	7,233.00	7,233.00	7,233.00	7,233.00	7,233.00	7,233.00
Trade payables	12,048.00	12,260.00	13,497.00	13,474.00	16,199.00	15,118.34	15,534.47	15,921.34	16,298.39	16,625.91	16,964.26
Deposits on returnable packaging materials	2,034.00	1,819.00	1,681.00	1,576.00	1,583.00	1,623.23	1,667.91	1,709.45	1,749.93	1,785.10	1,821.43
Provisions	510.00	648.00	722.00	591.00	1,100.00	1,100.00	1,100.00	1,100.00	1,100.00	1,100.00	1,100.00
Tax payables	796.00	601.00	935.00	931.00	878.00	878.00	878.00	878.00	878.00	878.00	878.00
Other liabilities	9,323.00	9,794.00	8,233.00	7,645.00	7,488.00	7,514.96	7,721.81	7,914.11	8,101.54	8,264.34	8,432.52
Total current liabilities	26,546.00	29,671.00	34,135.00	25,066.00	34,481.00	33,467.54	34,135.19	34,755.90	35,360.86	35,886.35	36,429.21
Liabilities ass. with assets held for sale	0.00	88.00	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total liabilities	81,461.00	77,670.00	73,256.00	64,726.00	69,811.00	69,897.87	73,201.68	74,835.30	76,756.74	77,815.98	79,767.30
Total equity and liabilities	137,458.00	124,901.00	126,906.00	114,251.00	117,700.00	116,313.80	120,028.24	122,652.33	126,244.35	129,433.56	133,131.48

Appendix 16: Equity Risk Premium by Region

Western Europe	ERP incl. CRP*	Consumption in liter
Bulgaria	8.60%	19
Estonia	6.94%	26
Greece	14.99%	20
Hungary	9.02%	15
France	6.65%	33
Denmark	5.96%	59
Sweden	5.96%	46
Norway	5.96%	50
Finland	6.51%	78
Switzerland	5.96%	56
Portugal	9.02%	52
Germany	5.96%	85
Poland	7.14%	98
United Kingdom	6.65%	66
Italy	9.02%	25
Latvia	7.63%	26
Lithuania	7.63%	26
Croatia	10.13%	13
Serbia	10.96%	13
Weighted Average Western Europe	**7.16%**	

Eastern Europe	ERP incl. CRP*	Consumption in liter
Azerbaijan	10.13%	5
Belarus	14.99%	50
Kazakhstan	9.02%	32
Russia	9.43%	52
Ukraine	16.37%	42
Weighted average Eastern Europe	**12.52%**	

Asia	ERP incl. CRP*	Consumption in liter
China	6.94%	27
Hong Kong	6.65%	23
India	8.60%	2
Malaysia	7.63%	6
Myanmar	16.37%	8
Singapore	5.96%	22
Sri Lanka	12.21%	1
Cambodia	13.60%	59
Vietnam	10.96%	42
Weighted Average Asia	**10.21%**	

*Source: Damodaran; CRP = Country Risk Premium

Appendix 17: Equity Report Comparison

in million DKK	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E
Total Revenues										
Dissertation	64,341	66,279	68,082	69,808	71,303	72,857	74,335	75,732	77,041	78,257
ODDO BHF	63,121	65,356	67,670	70,065	72,167	74,332	76,562	78,859	79,648	80,444
EBIT										
Dissertation	9,197	9,510	10,142	10,422	10,664	11,201	11,504	11,736	11,953	12,139
EBIT % Dissertation	14.29%	14.35%	14.90%	14.93%	14.96%	15.37%	15.48%	15.50%	15.52%	15.51%
ODDO BHF	10,088	10,773	10,773	11,970	12,546	13,145	13,769	14,419	14,563	14,709
EBIT % ODDO BHF	16.00%	16.50%	16.80%	17.10%	17.40%	17.70%	18.00%	18.30%	18.30%	18.30%
CapEx										
Dissertation	4,517	4,653	4,779	4,901	5,005	5,115	5,218	5,316	5,408	5,494
ODDO BHF	-4,166	-4,313	-4,466	-4,624	-4,763	-4,906	-5,053	-5,205	-5,257	-5,309
% of Revenue ODDO BHF	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
D&A										
Dissertation	4,338	4,469	4,590	4,707	4,807	4,912	5,012	5,106	5,194	5,276
ODDO BHF	4,642	4,813	4,984	5,160	5,315	5,474	5,639	5,808	5,866	5,925
CapEx/D&A ODDO BHF	0.897	0.896	0.896	0.896	0.896	0.896	0.896	0.896	0.896	0.896
FCFF										
Dissertation	5,991	7,133	7,556	7,745	7,864	8,261	8,523	8,631	8,763	8,870
ODDO BHF	7,798	8,319	8,339	9,221	9,654	10,104	10,572	11,060	11,170	11,282

Appendix 18: List of Abbreviations

A&JV	Associates & Joint Ventures
APV	Adjusted Present Value
bn	Billion
Bps	Basis points
BS	Balance Sheet
CAGR	Compound annual growth rate
CapEx	Capital Expenditures
CAPM	Capital Asset Pricing Model
D	Debt
D&A	Depreciation and Amortisation
DCF	Discounted Cash Flow
DCI	Days Inventory Outstanding
DDM	Dividend Discount Model
DKK	Danish Krones
D/V	Debt-to-Value Ratio
DPO	Days Payables Outstanding
DSO	Days Sales Outstanding
E	Equity
EBIT	Earnings before Interest and Taxes
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortisation
ERP	Equity Risk Premium
EUR	Euro
EV	Enterprise Value
E/V	Equity-to-Value Ratio
FCFE	Free-Cash-Flow to Equity
FCFF	Free-Cash-Flow to the Firm
g	Growth Rate
GDP	Gross Domestic Product
IA	Intangible Assets
IS	Income Statement
ITS	Interest Tax Shield
K_e	Cost of Equity
K_u	Required Rate of Return on Assets
K_d	Cost of debt
NCI	Non-Controlling Interests
NOPLAT	Net Operating Profit after Tax
NPV	Net Present Value
PER	Price-to-Earnings Ratio
PITS	Present Value Interest Tax Shield
PPE	Property, Plant and Equipment
PV	Present Value
R_f	Risk-free-Rate
R_j	Stock Return
RM	Return on Market
ROE	Return on Equity
ROIC	Return on Invested Capital
r	Discount Rate
T	Tax
TV	Terminal Value
V_u	Unlevered Firm Value
WACC	Weighted-Average Cost of Capital
WC	Working Capital
YTM	Yield to Maturity
ß	beta
$ß_u$	Beta unlevered
$ß_L$	Beta levered

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