# MASTEROPPGAVE

Emnekode:
BE305E

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# Valuation of Tomra Systems ASA

Dato: 22.05.17

Totalt antall sider: 110

NORD universitet

www.nord.no

# Abstract

In this paper, we aim to provide real life implications for investment decisions related to Tomra Systems ASA. In a world increasingly burdened by environmental waste, Tomra stands out as a pioneer in resolving the problem. Through a strategic analysis, we have highlighted information related to the past, present and the future. Our findings suggest that Tomra's strong position in the market is a source of advantage. Thus, the market maturity plays a significant role in determining whether the current growth rate can be sustained over time. The valuation is conducted through an intrinsic valuation and a project analysis related to recent legislative measures in the UK.

Our value estimate of 147.8 NOK per share suggest that the stock is trading at a premium when comparing to the prevailing stock price of 159.8 NOK. However, due to the limited downside of 7.5%, we deem it reasonable to issue a **HOLD** recommendation for Tomra Systems ASA.

# Preface

This Master thesis is written as a part of achieving a Master of Science in Business at Nord University Business School. The degree counts for 30 ECTS credits and the topic is related to our major in finance.

Our motivation for writing a valuation report originates from past experience with the subject in both Norway and Australia. We have previously done similar assignments with good results, but not with the depth and complexity required in a master thesis. Valuation is highly relevant for our major in finance and gives us the ability to utilize a broad specter of subjects we have learned during our master degree. In January 2018 Eivind participated in the CFA research challenge. The challenge required the participants to write a valuation report on Tomra. Participation in the challenge gave an extended insight to the company. The work on this paper has been a challenging and educational process. We have been able to use our theoretical knowledge to solve a practical problem and learned a great deal in the process.

Finally, we would like to express our sincere gratitude towards our supervisor Kristian Støre for his useful feedback and advice throughout the process. We also want to thank our fellow students at Nord University Business School for their contribution to a wonderful study period in Bodø.

Bodø, 21. May 2018

| | |
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# 1 Introduction

We shall in this part discuss the choice of topic and motivation for writing this paper. The chapter is concluded with an overview of the structure and framework used throughout the paper.

## 1.1 Motivation and actualization

Climate change is among the top priorities of world leaders and organization. The growing concern for the environment and global warming, makes the waste management industry highly attractive for investors. When searching for a relevant company that operates within this area, we found Tomra Systems ASA to be the most interesting company on the Norwegian stock market. By doing a strategic analysis and a fundamental valuation, our aim is to illuminate whether Tomra is a potential profitable investment. Valuations of Tomra has been conducted earlier, but due to changes in market conditions and more recent financial information, we believe that an independent, in depth research could contribute with newfound and up to date implications. For this reason, our research question is: *"What is the value of one share of Tomra Systems ASA?"*. We intend to utilize our estimate to issue a buy, hold or sell recommendation based on the prevailing trading price.

## 1.2 Structure

In chapter 2, we present Tomra's history and current operations. The chapter is concluded with a brief presentation of their competitors. Chapter 3 is dedicated to a presentation of the research methods we have utilized throughout our research. In chapter 4, we will discuss different approaches to valuation. We will highlight pros and cons of different methods and argue why we have chosen to value the company through an intrinsic valuation, multiples and a scenario analysis. Chapter 5 contains an analysis of the company's strategic position, both internally and externally. The strategic analysis lays the foundation for our expectations of future growth and performance. Chapter 6 provides an overview of historical annual statements. We will restructure these to fit an investors perspective. The chapter is concluded with adjustments for R&D and operating lease expenses. In chapter 7, we will conduct a credit analysis, to gain insight to the company's financials. chapter 8, 9 and 10 contains calculations of the valuation inputs. We will argue and discuss how we expect these to develop in the future. These inputs are used to forecast the present value of cash flows in chapter 11. In chapter 12 we derive our value estimate for Tomra Systems ASA through a free cash flow to firm model, multiples and a scenario analysis. The uncertainty of the of the models is assessed in chapter 13, where we

perform a sensitivity analysis on some of the most critical inputs. Chapter 14 contains a conclusion of our analysis.

## 1.3 Framework

The strategic analysis (chapter 5) is conducted through well renowned methods as PESTEL, Porter's 5 forces and VRIO. Most of these are presented in "Exploring Strategy" (Johnson, Whittington, Regnér, & Angwin, 2014). Theories presented in "Investment Valuation" (2012) by Aswath Damodaran has been diligently used throughout the valuation part (chapters 6 to 13). Our aim has been to supplement these with several other well renowned theories to obtain an unbiased estimate. Our preferred valuation methods will be presented in chapter 4.

# 2 Company and business presentation

In this chapter, we will present an overview of Tomra's history, operations and competitors.

## 2.1 History

Tomra Systems ASA is a Norwegian technology company delivering sensor-based solutions for waste management, sorting solutions and reverse vending machines. Tomra was founded by Tore and Petter Planke in 1972, in the Norwegian city of Asker. Their initial business idea was to produce a system to simplify the process of returning used beverage bottles. This idea helped create the first reverse vending machine. By the end of 1972, 29 machines had been installed in Norway. Their first big contract was signed in 1974 when the Swedish state-owned "Systembolaget" ordered 100 machines specialized for their existing conveyor system. In 1977 Tomra developed a bottle recognition technology, which helped the company grow rapidly. This lead to the first self-programmable reverse vending machines and gave Tomra a competitive edge going in to the 1980s.

Tomra was listed on the Oslo Stock Exchange in 1985 after a period of optimism and growth in the United States market. In 1986 the Soviet Union dumped millions of tons of aluminum in to the market leading to a 60 percent drop in the aluminum price. This removed incentives to recycle used aluminum and rendered Tomra close to bankruptcy. 1986 ended with an EBITDA loss of 129,6 million NOK but Tomra followed up the year after by delivering positive earnings.

In 1992, Tomra acquired the company NEROC and entered the sorting business. The entry of a new business segment helped diversify the company's operations, which up until this point only had included collection of beverage containers. In 2017 Tomra System ASA generated a revenue of 7,4 billion NOK, with 50 % of the revenue generated from each of the two segments.

## 2.2 Company

Today Tomra is the world's leading company in collection of used beverage containers, and one of the leading companies in automated sorting solutions. Stefan Ranstrand is the company President and CEO, which employs 3420 people globally. The Tomra Group is organized in two main business areas: Collection Solutions (reverse vending, and material recovery) and Sorting Solutions (food, recycling, and mining) with subsidiaries reporting to the holding company. Figure 1 provides an overview of these subsidiaries.

**REPORTING STRUCTURE**

The Group's consolidated amounts comprise the following units:

**Tomra Systems ASA**

**Europe**
Tomra Europe AS (NO)
Tomra Butikksystemer AS (NO)
Tomra Systems AB (SE)
OY Tomra AB (FI)
Tomra Systems AS (DK)
Tomra Holding OÜ (EN) (57,5%)
Tomra Service OÜ (EN) (57,5 %)
Tomra Systems UAB (LH) (57,5%)
Tomra Systems BV (NL)
Tomra Systems GmbH (DE)
Retail Services GmbH (DE)
Tomra Leergutsysteme GmbH (AT)
Tomra Systems SA (FR)
Tomra Systems NV (BE)
Tomra s.r.o (CZ) (40 %)
Tomra Systems D.O.O (HR) (70%)
Tomra Production AS (NO)
Tomra Sorting AS (NO)
Tomra Sorting GmbH (DE)
Tomra Sorting S.L. (ES)
Tomra Sorting Ltd. (UK)
Tomra Sorting Sp. Z.o.o. (PL)
Tomra Sorting S.a.r.l. (FR)
Tomra Sorting SRO (SK)
Tomra Sorting Ltd (IE)
Tomra Sorting SRL (IT)
Odenberg Engineering BV (NL)
Best Sorting Spain S.L. (ES)
Tomra Sorting NV (BE)
Tomra Sorting BV (NL)
Belgian Electronic Sorting Technology TR Mak. San. Tic. A.S. (TR)
Best Vastgoed (NL)
Compac Sorting Eq. Europe (UK)

**North-America**
Tomra of North America Inc. (DE)
Tomra of North America Finance Company LLC (DE)
Tomra Metro LLC (CT)
Western New York Beverage Industry Collection and Sorting LP (74%) (NY)
Tomra New York Recycling LLC (64,63%) (NY)
Upstate Tomra LLC (55%) (NY)
Tomra Mass. (55%) (MA)
Tomra Canada Inc. (CA)
Tomra Pacific Inc. (DE)
UBCR (51%) (MI)
UltrePET LLC (49%) (NY)
Tomra Compaction LLC (DE)
Returnable Services LLC (DE)
Synergistics LLC (51%) (MI)
Tomra Sorting (CA)
Tomra Sorting, Inc. (US)
Compac Sorting Eq. Ltd. (US)
Tomra Claims Resolution Company (US)

**Rest of the world**
Tomra Sorting Japan KK (JP)
Tomra Japan Ltd. (50%) (JP)
Tomra Sorting Co, Ltd. (KP)
Tomra Sorting (Pty) Ltd. (ZA)
Tomra Sorting (Pty) Ltd. (AU)
Tomra Sorting Technology (Xiamen) Co. Ltd. (CN)
Tomra (Xiamen) Imp. & Exp. Co. Ltd. (CN)
Tomra Brasil Solucoes EM segregacao LTDA (BR)
Tomra Sorting JLT (AE)
Tomra Sorting Chile SpA (CL)
Tomra Sorting India Private Limited (IN)
Tomra Sorting OOO (RU)
Best Hong Kong Int. Ltd. (HK)
Tomra Recycling Technology (Xiamen) Co. Ltd (51%) (CN)
Incom Tomra Recycling Technology (Beijing) Co. Ltd (49%) (CN)
Bottlecycler Australia Pty Ltd (60%) (AU)
Tomra Collection Pty Ltd (80%) (AU)
Tomra Cleanaway Pty Ltd (50%) (AU)

Compac Holding Ltd. (NZ)
Compac Inter Ltd. (NZ)
Lenz Equipment Ltd. (NZ)
Compac Sorting Eq. Ltd. (NZ)
Compac Sorting Eq. Ltd. (AU)
Compac Sorting Eq. Ltd. (CN)
Compac Sorting Eq. Latin America (CL)
Compac Tech Ltd. (NZ)
Compac Kunshan (CN)
Compac International Trade China (Kunshan) Co. Ltd. (CN)
Taste Tech Ltd. (NZ)
Taste Tech Install Ltd. (NZ)
Tastemark Ltd. (NZ)

Tomra Baltic OÜ (EN) was merged with Tomra Service OÜ in 2016, and Fastighetsbolaget TFAB i Tommelillla AB (S) was sold in 2016. Tomra Collection Pty Ltd was acquired in 2016.

Bottlecycler Australia Pty Ltd. was acquired in 2016, and Tomra Cleanaway Pty Ltd was founded in 2017.
CBSI LLC was merged with Tomra North America Inc. in 2017.
Compac Holding Ltd. including subsidiaries was acquired in 2017.

*Figure 1: Reporting structure, (Tomra Systems ASA, 2018a)*

## 2.3 Shareholders

| Investor | Number of shares | % of top 20 | % of total | Country |
|---|---|---|---|---|
| INVESTMENT AB LATOUR | 39 000 000 | 39 000 001 | 26,35 % | SWE |
| FOLKETRYGDFONDET | 10 713 577 | 10 713 578 | 7,24 % | NOR |
| THE BANK OF NEW YORK MELLON SA/NV | 7 845 000 | 7 845 001 | 5,30 % | NLD |
| GOLDMAN SACHS & CO. LLC | 4 287 470 | 4 287 471 | 2,90 % | USA |
| CLEARSTREAM BANKING S.A. | 3 350 205 | 3 350 206 | 2,26 % | LUX |
| LANNEBO SMÅBOLAG | 3 000 000 | 3 000 001 | 2,03 % | SWE |
| NORDEA NORDIC SMALL CAP FUND | 2 149 276 | 2 149 277 | 1,45 % | FIN |
| DANSKE INVEST NORSKE INSTIT. II. | 2 079 442 | 2 079 443 | 1,40 % | NOR |
| ODIN NORGE | 1 894 271 | 1 894 272 | 1,28 % | NOR |
| BNP PARIBAS SECURITIES SERVICES | 1 745 746 | 1 745 747 | 1,18 % | LUX |
| SEB NORDENFOND | 1 657 898 | 1 657 899 | 1,12 % | SWE |
| SEB SVERIGEFOND SMABOLAG | 1 504 131 | 1 504 132 | 1,02 % | SWE |
| JPMORGAN CHASE BANK, N.A., LONDON | 1 489 243 | 1 489 244 | 1,01 % | USA |
| STATE STREET BANK AND TRUST COMP | 1 348 106 | 1 348 107 | 0,91 % | USA |
| SKANDINAVISKA ENSKILDA BANKEN S.A. | 1 325 556 | 1 325 557 | 0,90 % | LUX |
| SEB SVERIGEFOND | 1 324 650 | 1 324 651 | 0,89 % | SWE |
| JPMORGAN CHASE BANK, N.A., LONDON | 1 230 184 | 1 230 185 | 0,83 % | SWE |
| SUNDT AS | 1 217 025 | 1 217 026 | 0,82 % | NOR |
| JUPITER ECOLOGY FUND | 1 203 681 | 1 203 682 | 0,81 % | GBR |
| J.P. MORGAN BANK LUXEMBOURG S.A. | 1 192 596 | 1 192 597 | 0,81 % | LUX |
| **Total number owned by top 20** | 89 558 057 | 89 558 058 | 60,50 % | |
| **Total number of shares** | 148 020 078 | 148 020 079 | 100 % | |

*Table 1: Major investors*

Tomra has a history of paying dividends to their shareholders on an annual basis. Their aim is to distribute 40%-60% of earnings per share to dividends. Table 2 shows Tomra's historical dividend payouts (Tomra Systems ASA, 2018a).

| Dividends | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Ordinary DPS | 1.35 | 1.45 | 1.75 | 2.1 | 2.35 |

*Table 2: Historical dividends*

## 2.4 Historical stock returns

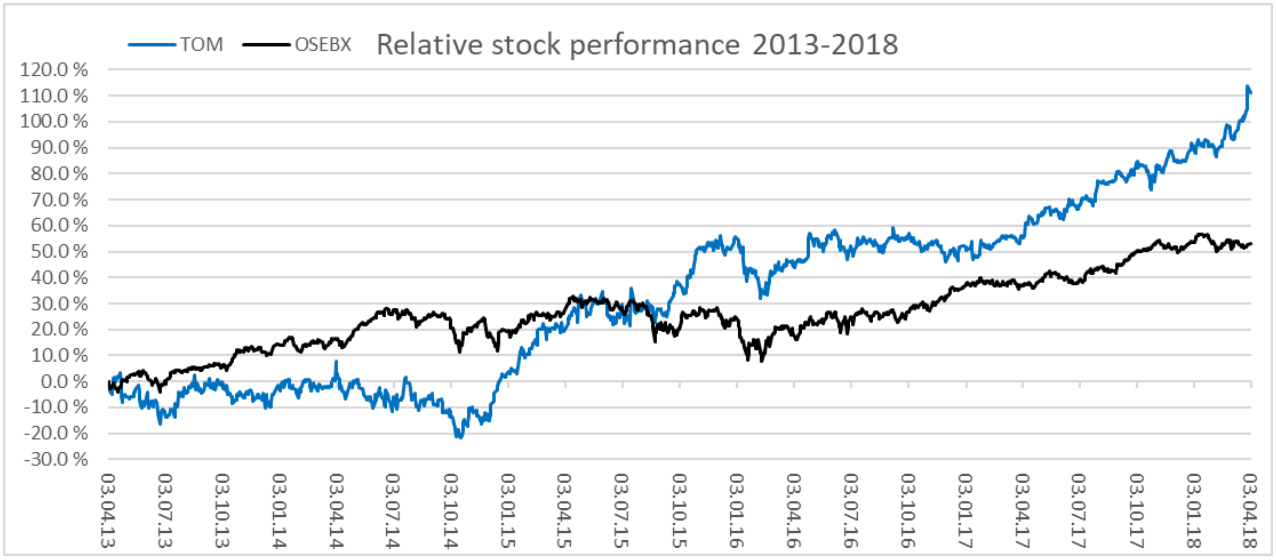


*Figure 2:Historical cumulative returns 2013-2018*

Figure 2 shows historical returns of the Tomra stock relative to the overall market return during the last 5 years. Tomra is represented with returns on adjusted close prices, to adjust for the company's annual dividend payouts. The Tomra stock has increased with over 110% over this period. In comparison, the market has increased with only about 50% during the same period.

## 2.5 Products

Tomra Collection solutions is comprised of reverse vending and material recovery business areas. Reverse vending accounted for 38 percent of total sales in 2017 and employed 1375 people. The main customers are grocery retailers which are imposed by law to collect empty beverage containers. Tomra offers a complete solution ranging from the smallest store to the largest industrial scale segment of collection.


*Figure 3:RVM portfolio*

In 2013, Tomra presented a new generation of reverse vending machines. The T-9 machine features a 360-degree recognition system and works faster, cleaner and accept all types of beverage containers.

Material recovery is used in logistics and process systems, and often integrated with Tomra's reverse vending machines. This segment accounted for 14 percent of total sales in 2017 and employed 550 people. The main customers are grocery retailers and beverage producers. Tomra's products are used to process material to the highest quality of collected material.

Tomra Sorting solutions delivers products to the food sorting, recycling and mining industry. The food sorting segment accounted for 33 percent of total sales in 2017, divided on bulk sorting and lane sorting. The customers are food growers and companies that do package and processing of grown food. Tomra's sensor-based technology is designed to maximize yield and recovery while reducing waste. It has proven to be highly consistent and provides assurance in customer safety. Tomra's product portfolio consist of more than twenty different food sorting machines highly specialized for different types of use.

The recycling segment is aimed at machine metal sorting and waste recycling, and accounted for 12 percent of sales in 2017. As global leaders in this segment, their automations are flexible and perform at a wide range of recycling tasks. The technology is sensor-based and operates at a rate of up to 320000 scan points per second.

The mining segment accounted for 3 percent of total sales in 2017, and is aimed towards sorting in mining operations. The range of advanced recognition technologies offers the ideal sensor combination for diamond, gold, limestone, coal or other types of ore. Materials which pass through the sorting process are often heavy, dusty and abrasive, and thus demand a technological design which is incredibly robust in every respect. Tomra Sorting Solutions combine material handling, recognition and pressurized air ejection technologies in a

thoroughly optimized system which reliably separates valuable mineral ores from waste rock. Using Tomra sorting technology can reduce the energy consumption by 15 % compared to standard mining equipment and save three or four cubic meters of water per ton of ore.

## 2.6 Competitors

Tomra competes with different companies in the different business segments. This is a short presentation of some of their rivals within the collection and sorting segments:

### 2.6.1 Diebold Nixdorf

Diebold Nixdorf (New York Stock Exchange ticker: DBD) is a world leader in delivering self-service technological solutions for financial institutions and retailers. Diebold acquired Wincor Nixdorf in 2016 and renamed the company Diebold Nixdorf. The company has its head office in Green, Ohio USA and employs 23 000 people. In 2017, they reported a revenue of $4,609 billion and a net income of -$233,1 million. Their product portfolio consists of solutions used in ATMs, cash registers, and (reverse) vending machines. Diebold Nixdorf competes with Tomra on the market for reverse vending machines. They have, as of 2017, installed approximately 10 000 machines in 20 different markets globally (Diebold Nixdorf, Incorporated, 2017).

### 2.6.2 Envipco Holding

Envipco Holding NV (Euronext Brussels ticker: ENVI) provides reverse vending systems on the North American, European and Australian markets. The company was founded in 1979 by Bruce DeWoolfson and is headquartered in The Netherlands. The company has described itself as the number two company and a challenger to the world leader in providing reverse vending machines. In 2017, the company reported a revenue of € 34 million and a net income of -€690 000 (Envipco Holding N.V, 2017).

### 2.6.3 RVM systems AS

RVM systems AS is a Norwegian reverse vending machine company established in 1994. Their business idea is to develop, produce and install reverse vending machines (RVM) in retail stores of all sizes. The company reported in 2016 (2017 figures not available) a revenue of 23,8 million NOK and a net income of -8,44 million NOK (RVM Systems AS, 2017a) They employ 20 people at their head office in Drammen, Norway. RVM systems AS is regarded as a small company and mainly a competitor in the Nordic region, but has delivered their solutions to Austria, The Netherlands, Chile and Argentina and installed over 5000 RVMs in total (RVM Systems AS, 2017b).

### 2.6.4 Bühler Sortex

Bühler Sortex is a global market leader in providing sorting technologies and methods for grain sorting, as well as production of pasta, chocolate in die casting, wet grinding and surface coating. The company was founded in 1947 and runs its operations from their main office in Uzwil, Switzerland. The company's main trait is competence in thermal and mechanical process engineering. Bühler Sortex is a subsidiary of the Bühler Group which operates in over 140 countries. In 2017, around 11,000 employees from all regions generated a turnover of CHF 2.7 billion (Buhler Group, 2018a).

### 2.6.5 Key Technology

Key Technology (NASDAQ ticker: KTEC) is a global provider of food sorting equipment and technology. They were established in 1948 and based in Washington, USA. Their main competence is within sorting of agricultural products, grains, fruit and vegetables. They have delivered more than 3500 sorting machines. In 2016 (2017 figures not available) they reported a revenue of $120 million and a net income of -$697 000 (Key Technology, 2016).

# 3 Methods

We shall in this chapter explain how the research paper has been carried out and which research methods that have been used. We will also explain the research design and which data sources that have been used. As an equity research paper, our thesis aims to estimate the value of one share of Tomra Systems ASA. In order to make this as accurate and reliable as possible, a thorough in-depth explanation of the research methods applied is of utmost importance.

## 3.1 Epistemology

Modern financial theory is a social science where the mathematical complexity compares to that of natural sciences (Scheemaekere, 2009). By the standard of the natural sciences, science in financial economics has failed in predicting anything with the equivalent accuracy and reliability. Financial models like the CAPM-Capital Asset Pricing Model (Sharpe, Capital asset prices: A theory of market equilibrium under conditions of risk, 1964) or OPM- Option Pricing Model (Black & Scholes, 1973) are described as "useful framework" (McGoun, 2003) and have achieved mathematical success by modeling the risk/reward relationship combined with the uncertainty of the stock market. This implies that financial theory deals with the challenges similar to that of a statistician (Arrow, 1970) with the models being subjected to highly unpredictable variables. Friedman (1953) argues for a positivistic view on financial theory and based his methodology on three tenets:

- 1. The primary requisite of a theory is to produce acceptable forecasts.
- 2. The secondary requisite of a theory is to be simple and fruitful.
- 3. The assumptions of the theory must be unrealistic to satisfy requisites 1 and 2.

The crucial difference between variables in natural science and financial modeling is the people's expectation of the price, which has a huge influence on the price of a financial asset. In order to build a consistent theory, one must overcome the complexity of the nature and simplify it to model it. From this perspective it can be argued that the epistemology in financial theory is constructionism, which is based on the assumption that there are many truths. This implies that people invent structures to help them understand what is happening around them. While financial theory is based on numerical input and the analysis and interpretations is based on correlation and regression, the human element of behaviors makes finance fundamentally relative and non-causal. The predictive power of financial models like CAPM and OPM are biased on the sense that they face uncertainty from the probabilistic nature of the variables. This

is because they are derived from historical data, which does not guarantee the same outcome in the future.

## 3.2 Design

"Research designs are about organizing research activity, including the collection of data, in ways that are most likely to achieve the research aims" (Easterby-Smith, Thorpe, & Jackson, 2015, p. 67). Our aim is to analyze Tomra, and determine the value of one share in the company. To do that, we must study the company in depth and over time. Thus, the arguments for labeling this as a case study of the company, are strong. Johannessen, Christoffersen & Tufte (2004) outlines three types of research design: explorative, causal, and descriptive. Explorative research attempts to answer why something happens. Causal research attempts to establish a cause and effect relationship between variables. Descriptive research attempt to describe the unit of study in great detail. Our study falls under the last category.

## 3.3 Data collection

(Damodaran, 2017) argues for a bridged gap between numbers and narratives in valuation. He insists that the best valuation is a story connected to numbers. This means that our valuation will include both qualitative and quantitative data. Hence, the quantitative data should be used to calculate the valuation and the qualitative data to create the narrative. All valuations are biased. To make the valuation as valid and reliable as possible, we aim to limit the degree and in which direction the bias occurs.

The quantitative data can be collected in three different ways: via observation, questionnaire and secondary data from an existing database (Easterby-Smith, Thorpe, & Jackson, 2015). In this paper, the data samples are secondary data collected from the computer software Bloomberg Terminal. This is a computer software system provides "*real-time market data on every market, as well as breaking news, in depth research and powerful analytics communications tools and world-class execution capabilities"* (Bloomberg, 2018). This software provides a reliable source of information and the necessary input in the valuation models.

As a publicly listed company on Oslo Stock Exchange, we have used freely available data from quarterly reports, annual reports, investor presentations and information collected from Tomra's website. This provides information on Tomra's operations, accounts and financial situation. We consider these data sources reliable, since they are produced by the company itself and made for investor purposes. Other sources include: Norwegian law, EU regulatory

proposals and news articles on related fields. All data used in this paper has been publicly accessible, as a valuation based on inside information is both illegal and unethical. These data sources are also relevant for the qualitative analysis. The financial data in this thesis was last updated on **03.04.2018** to include Tomra's latest annual report. We will compare our value estimate with the stock price on this date. The price for one share of Tomra was **159.8 NOK** on 03.04.2018**.**

## 3.4 Validity and reliability

According to Joppe (2000), validity is described as to which degree the research actually measures what it intends to do. (Yin, 2014) focuses on internal and external construction validity. Internal validity relates to whether there is a causal relationship between the cause and effect, and hence how one can generalize from the conclusion. To strengthen the internal validity, we intend use correct historical data based on the adjusted closing price of the Tomra stock. We have also used multiple methods to verify of the key inputs to the valuation. This is referred to as triangulation (Easterby-Smith, Thorpe, & Jackson, 2015). From the fact that valuation models are case by case dependent, there is no guarantee that the methods conducted in this paper will hold true for a different company valuation or the same company in a different time period. By this sense the external validity is to be regarded as weak. However, this is consistent with the epistemological view of modern finance.

Reliability refers to how reliable and accurate the collected data is structured and processed. To test the reliability, one can perform the same test multiple times and if the results are similar the test is considered reliable (Easterby-Smith, Thorpe, & Jackson, 2015). It is hard to argue for a high degree of reliability in a case study framed by the financial environment. We have collected the data a single date of valuation as a measure to enforce the reliability. In addition, we have dedicated this chapter to inform the reader on how we conducted the research.

# 4 Valuation methods

Valuation methods can take many different shapes and forms. In this part, we will introduce several of the common approaches an analyst can have to a valuation. Furthermore, we will present some of the different techniques within each approach. We will continue by discussing the accuracy of valuation and state our chosen approaches and techniques for this study.

## 4.1 The intrinsic value approach

The intrinsic value approach aims derives the actual value of an asset based on the assumption that the underlying perspective of the asset are tangible and intangible factors. This concept was first introduced by John Williams (1938). This concept laid the foundation for the discounted cash flow theory, in which fundamental valuation is based on. Fundamental valuation is reliant on input variables that reflects the cash generating properties of the asset, the expected growth in cash flow and the riskiness of the investment. All these factors are derived from different data sources.

Intrinsic valuation can be divided further into three different techniques (Reilly & Brown, 2012):

1. Present value of dividends (DDM): In the dividend discount model, the expected dividends are used to derive the value of equity. The underlying assumption is that the intrinsic value of a company is the sum of present values of all future expected dividends. Tomra has a history of paying dividends, which is a prerequisite of using the model. "The model works best for firms that maintain a policy of paying out residual cash flows as dividends" (Damodaran, 2012, p. 331).

2. Present value of free cash flow to equity (FCFE): The FCFE model measures a firm's ability to pay shareholders after meeting its obligations.

$$FCFE = net\ income - net\ capex - \Delta working\ capital + net\ borrowings$$

Where:

$$Net\ capex = capital\ expenditure - depreciation$$

$$\Delta Working\ capital =$$

$$(Current\ assets - current\ liabilities)_t$$

$$-(Current\ assets - current\ liabilities)_{t-1}$$

$$Net\ borrowings = new\ debt\ issued - debt\ repayments$$

FCFE is the cash flow available to stockholders after payments to all other capital suppliers and after reivesting for the continued growth of the company (Reilly & Brown, 2012). The model represents an alternative to the DDM, capturing what the firm theoretically can pay to shareholders rather than what they pay. With that in mind, it can be said to be more suitable to apply on firms with low payout ratios.

3. Present value of free cash flows to the firm (FCFF): FCFF are the cash flows attributable to all capital providers in the company, both equity and debt. In other words, this model returns the enterprise value (EV) of the firm. The enterprise value can be defined as the market capitalization plus net debt.

$$FCFF = EBIT(1 - t) - Net\ Capex - \Delta Noncash\ Working\ Capital$$

Where:

$$t = tax\ rate$$

$$Net\ capex = capital\ expenditure - depreciation$$

$$\Delta Working\ capital$$

$$= (Current\ assets - current\ liabilities)_t$$

$$-(Current\ assets - current\ liabilities)_{t-1}$$

The intrinsic value of a company in steady growth is derived through following formula:

$$V_0 = \frac{CF_1}{k_{c,sg} - g_s}$$

Where:

$$V_0 = Intrinsic\ value\ of\ the\ company\ (equity)$$

$$CF_1 = Expected\ cash\ flow\ next\ year$$

$$k_{c,sg} = Stable\ cost\ of\ capital\ (equity)$$

$$g_s = Stable\ growth\ rate$$

The cash flow is represented by either the dividend, FCFE or FCFF. As shown in the formula, these should be discounted to present values via the cost of capital or cost of equity. The cost of equity should be applied to the FCFE and the DDM. The FCFE is discounted with the cost of capital. The discount rates differ because the FCFF is attributable to both providers of debt and equity. We will explain these discount rates in the next section. Several versions of the model are commonly used. The most important being the multistage model, which adjusts for periods of extraordinary growth.

### 4.1.1 Discount rates

The discount rates represent the return an investor can expect on equally risky investments. In other words, the discount rate can be interpreted as an investors alternative cost of investing in TOMRA relative to equally risky investments. The different cash flows are discounted through different rates.

#### *4.1.1.1 Cost of equity*

The cost of equity can be derived through the capital asset pricing model (CAPM). According to Damodaran, (2012), the CAPM is the risk and return model that has been in use the longest and still is the standard for most practitioners. The model is as follows:

$$r_a = r_f + \beta_a * (r_m - r_f)$$

Where:

$r_a$ = Expected return of an asset

$r_f$ = Risk-free rate

$\beta_a$ = Beta of a security

$r_m$ = Expected return on market portfolio

$(r_m - r_f)$ = Equity risk premium

The CAPM states that the company's risk factor equals the risk-free rate added to an equity risk premium (ERP). The ERP is adjusted with the company's beta to reflect the individual company's exposure to systematic risk.

#### 4.1.1.1.1 Risk-free rate

The risk-free rate is an investors theoretical return on a security with risk equal to zero. However, we can never know the risk-free rate for certain. Adam, Graham, Gunasingham, & Smart (2017) suggest using yields on observable instruments that are expected to behave in a similar fashion to risk-free assets, because themselves are low-risk assets. Companies therefore often use the 10-year government bond as a default proxy for a risk-free asset when making long-term investment decisions. The duration of the asset should, however, ideally match the duration of the investment. Koller, Goedhart, & Wessels (2010) supports the view of using 10-year government bonds for long term investments, as longer-dated bonds usually are illiquid. Their prices and yield premiums may not reflect their current value. They also stress the importance of using government bond yields denominated in the same currency as the company's cash flow. Inflation will then be modeled consistently between cash flow and the discount rate.

#### 4.1.1.1.2 Equity risk premium

Equity risk premium can be described as the difference between the expected return on the market portfolio and the risk-free rate. "In practice, we usually estimate the risk premium by looking at the historical premium earned by stocks over default-free securities over long time periods" (Damodaran, 2012, p. 161). It is this part of the CAPM that takes into account the riskiness provided by investments in stocks. In other words, the investor gets compensated for bearing risk related to investment in stocks.

#### 4.1.1.1.3 Beta

According to Klemkosky & Martin (1975, p. 1123) "The beta coefficient has gained wide acceptance as a relevant measure of risk in portfolio and security analysis". It measures the individual stock's systematic risk relative to the market. Thus, the beta tells about the risk-relationship between a company and the market. Again, the OSEBX is a natural benchmark to use when estimating Tomra's systematic risk. Damodaran (2012) defines beta as the covariance of the asset divided by the market portfolio:

$$\beta = \frac{Covariance\ of\ asset\ i\ with\ market\ portfolio}{Variance\ of\ the\ market\ portfolio} = \frac{\sigma_{im}}{\sigma_m^2}$$

Companies with beta > 1 is expected to have less systematic risk than the market, while the opposite can be said of companies with beta < 1. A company with a beta equal to 1 is expected to more or less move with the market.

### *4.1.1.2 Weighted average cost of capital*

The weighted average cost of capital (WACC) is a weighted average of after-tax cost of debt and cost of equity. It represents the required rate of return of a company to an investor.

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

Where:

$$K_e = Cost\ of\ equity$$

$$E = Value\ of\ equity$$

$$K_d = Cost\ of\ debt$$

$$t = tax\ rate$$

$$D = Value\ of\ debt$$

Koller, Goedhart & Wessels (2010) argues that the market values of equity and debt should be used. Damodaran (2012) supports this view, claiming it provides the best measure of how the firm is being financed. The book values can be used if the market values are not observable (Koller, Goedhart, & Wessels, 2010).

The cost of debt represents the company's interest rate on debt. It is included in the WACC, to discount the cash flow attributable to lenders. For investment-grade companies, it can be calculated by using the yield to maturity of the company's long-term, option-free bond (Koller,

Goedhart, & Wessels, 2010). There is an alternative method, where a risk premium based on credit spreads can be calculated from the credit rating. The default spread has a clear link with the cost of borrowing money. Higher spread means higher cost of borrowing as the lender needs to be compensated with a default risk premium on the loan. This premium is added to the risk-free rate. The risk-free rate sets the floor for the rate credit institutions are willing to lend money at, as no lender is willing to lend at a lower rate than the return on a risk-free investment. Some companies are not rated by an agency. A synthetic rating can be estimated for these (Damodaran, 2012). The after-tax value of cost of debt accounts for the tax deductibility of interest rates.

The WACC model is dependent on the model used for the cost of equity. In addition, there can be problems related to how the cost of debt is calculated. Companies with no credit rating can provide difficulties related to the cost of debt.

#### *4.1.1.3 Alternative discount rates*

As we mentioned, the CAPM is widely accepted and used in the world of finance. Nevertheless, it has often been criticized. One important factor in our calculation is the use of historical data. All inputs are based on historical data, which may not be representative of the future. This is also the case for normalized numbers like we used. Beta represents the slope coefficient of the CAPM. In other words, it is a company specific factor which explains the expected return through the company's systematic risk. Sharpe & Cooper (1972) found a relationship between these factors, although not completely linear.

The arbitrage pricing theory (APT) developed by Ross (1976) addresses this issue by involving several unique factors as a measure of risk. One major issue with the APT is that it can be challenging and time consuming to derive these factors.

Fama & French (1993) developed an extension of the classic CAPM, which builds on concepts from the APT. Their version includes two additional variables. One relates to the market capitalization of the specific firm, while the other relates to the book to market ratio.

## 4.2 The market approach

In the market approach, the analyst compares assets in the marketplace and their corresponding price, and assumes that the market tends to move the price to an equilibrium of supply and demand. This method is the foundation in relative valuation. In relative valuation, an asset is valued by looking at the market price of similar assets. In relation to stocks, this means that investors decide if a stock is underpriced by looking at the market price of similar stocks,

usually in its peer group. The approach is usually less time consuming than valuing a stock through an intrinsic valuation. Adam, Graham, Gunasingham, & Smart (2017) States that analyst often employ relative valuation in addition to other valuation models to estimate a range of plausible values.

Relative valuation is conducted through multiples. A multiple is a ratio of a company's health. It is derived from financial metrics. The numerator can be either the market capitalization or the enterprise value of the company. The denominator is typically a measure from the annual statement. The average or median multiple value from the peer group should be multiplied by the financial metric of the company of interest to obtain the value of the stock. We will now present three different multiples.

### 4.2.1 P/E

Price/earnings is a multiple which shows the ratio between the current market capitalization and net income.

$$Value\ of\ equity = \frac{Market\ capitalization_{peer}}{Net\ income_{peer}} \times Net\ income_{firm}$$

The market capitalization should be obtained at the time of valuation, while net income can be forward or trailing. Forward P/E requires the analyst to forecast the net income over the next 4 quarters. Trailing P/E is based on the last 4 quarters. The P/E represents how many times earnings investors are willing to pay per share.

### 4.2.2 P/B

Although widely used in the banking industry, the P/B multiple gained popularity and credibility for firms in all industries when Fama & French (1992) found a significant inverse relationship between P/B ratios and excess rates of return (Reilly & Brown, 2012). The value of equity for a company can be derived through the following formula:

$$Value\ of\ equity = \frac{Market\ capitalizaion_{peer}}{Book\ value\ of\ equity_{peer}} \times Book\ value\ of\ equity_{firm}$$

The P/B shows the relative relationship between market value and book value of equity. A P/B ratio above 1 implies that the market value is worth more than the book value of equity.

### 4.2.3 EV/EBITDA

While the Price/Earnings multiple is the most popular, EV/EBITDA contains a broader term of both inputs. EV is the enterprise value. In other words, the value of market capitalization and

debt less cash and cash equivalents. Cash is backed out as it is not invested in any part of the company. EBITDA is short for earnings before interest, tax, depreciation and amortization.

$$Value\ of\ capital = \frac{EV_{peer}}{EBITDA_{peer}} \times EBITDA_{firm}$$

One advantage of this multiples is that it looks past the capital structure of the company. Both inputs are attributable to the total capital of the firm.

## 4.3 The contingent claim approach

The third approach relates to a contingent claim which only pays of under a series of contingencies. The most common contingent claim is in use on option contracts. An option contract is the right, but not the obligation, to take an action at a predetermined cost called the exercise price, for a predetermined period of time. The value of an option contract can be determined as a function of the following input variables: The current value and the variance in value of the underlying asset, the strike price and the time to expiration of the option and the riskless interest rate. The option pricing model using these input variables was first developed by Black & Scholes (1973), and refined and fitted in numerous ways for different uses like for instance in real option analysis and project valuation (Damodaran, 2011).

## 4.4 Choice of model

The use of different valuation models to predict the value of a stock has been subjected to a set of tests for its accuracy. A study from University of Chicago (Francis, Olsson, & Oswald, 2000) on the accuracy of dividend discount models (DDM), free cash flow-models (FCF), and abnormal earnings (AE) shows that the AE estimate performs significantly better than DDM and DCF value estimate. The median absolute prediction error of AE is about ¾ of the FCF model (30 % vs. 41 %) and less than half of DDM model (30 % vs 69 %). AE value estimates explained 71 % of the variation in current stock price, compared to 51 % for DDM and 31 % of FCF value estimates. This was estimated at a 0 % growth rate. At 4 % growth, the FCF was shown to have the smallest variance (Francis, Olsson, & Oswald, 2000). A study from University of Venice (Cavezzali & Rigoni, 2013) argues that there is no significant difference in accuracy associated with methods based on company fundamentals and those on market multiples. This suggests that time consuming fundamental analysis yields no better results than low cost multiplier models. The assumption is that valuation models do not reflect the price of the asset, but rather the estimated value based on input variables. This means that the input variables must be normalized for extreme values to create a more predictable future cash flow.

However, net asset value models are proved to be an inferior model. This implies that an analyst can obtain a more accurate estimate by applying a set of wisely chosen methods, combine them, and obtain an average value.

Reilly & Brown (2012) argues that all intrinsic value models must be compared to the prevailing market price to determine the investment decision. Damodaran (2012) on the other hand, discusses the pitfalls of choosing an unsuited intrinsic valuation model. Koller, Goedhart & Wessels (2010) claims the FCFE and FCFF method will yield the same value if they are applied correctly. Furthermore, they recommend using FCFF methods for valuing non-financial companies. We will therefore conduct a valuation of Tomra through the FCFF model. Suozzo, Cooper, Sutherland & Deng (2001) claims that combining too many value drivers into a single estimate is one of the dangers of multiples. Additionally, they sometimes fail to capture the dynamic nature of business and competition. Therefore, we wish to make use of multiples to supplement our intrinsic valuation. Liu, Nissim & Thomas (2002) found in their study that forward- and historical earnings measures were the best in terms of relative performance of explaining stock prices. The prevalence of this model is difficult to overlook when choosing a multiple. Koller, Goedhart, & Wessels (2010) suggest always starting with the EV/EBITDA when comparing through industry multiples. According to Lie & Lie (2002), EBITDA multiples generates more precise and less biased estimates than EBIT multiples. We want to include the EV/EBITDA multiple to enforce the robustness of the estimate. The P/B ratio provides an alternative denominator to common earnings models. Through this multiple, we can obtain an alternative view on how the company is priced in the market. Thus, we will triangulate our intrinsic valuation with all three presented multiples.

In our strategic analysis, we have not found any evidence supporting an option-based valuation of Tomra. However, the possible new bottle return scheme in UK provides an interesting opportunity for the company. We will come back to this in the strategic analysis. This opportunity has several outcomes which we will treat as an additional cash flow.

The valuation in this paper will be therefore be conducted by using a FCFF model, and the multiples stated above. Additionally, we will perform a project investment analysis based on basic principles in decision tree analysis. In this analysis, the expected value will be weighted after the probability of the outcome. The outcomes in the project investment analysis will also be derived through a FCFF-model.

# 5 Strategic analysis

A strategic analysis is a qualitative study of underlying economic factors. The main objective of the strategic analysis is to examine the company and its business practice. This analysis can reveal competitive advantages, which can be found in both internal and external business processes. We aim to use the strategic analysis to create the narrative for our valuation.

## 5.1 Company strategy

We will initiate this chapter by describing the overall strategy of the company.

### 5.1.1 Vision, Mission and objectives

In a world where the economy is under pressure from climate change and forced to innovate the way resources are managed, Tomra's vision is to lead this resource revolution.

Tomra's ambition is to be a leader in the revolution by creating sensor-based solutions for optimal resource productivity. Providing smart solutions for optimizing our resources – sourcing them, using them, stewarding them, reclaiming them, recycling them and revitalizing them – is key to the resource revolution. Tomra engages in two main business areas: Tomra Collection Systems (TCS) and Tomra Sorting Systems (TSS). Each business stream contributes to resource productivity in different ways. TCS Reverse Vending ensures efficient collection of beverage containers for high-grade recycling and reuse. TCS Material Recovery processes empty beverage containers for recycling. TSS Food sorts and processes fresh and processed food, increasing quality, safety and efficiency. TSS Recycling enables valuable materials to be recovered from waste and metal material streams. TSS Mining helps extend the life of mining operations by separating valuable mineral ores from waste rock (Tomra Systems ASA, 2017a).

Through a unique product design and highly developed technology, the machines delivered by Tomra will be able to increase the amount of usable resources collected and sorted from a stream of materials.

### 5.1.2 Operations overview

Porter's value chain (Porter, 1985) illustrates the way a company carries out its business. The chain is separated in primary activities and supportive activities. Primary activities are defined as the activities that add value to the product or service, and consists of the following:

- Inbound logistics
- Operations
- Outbound logistics

- Marketing and sales
- Services

Tomra's inbound logistics consist of standardized and cost optimized products. Standardized products attract many suppliers, which may lead scale benefits due to large orders from suppliers. The operation process and assembly are largely automated in six production entities, with China as center for product development and sourcing location. The machines are mass produced in low cost countries and sold by contract to customers in different regions of the world. Outbound logistics is provided by a third-party logistics party. Marketing and sales as well as post sale service is handled by over 60 agents and distributors globally.

Supporting activities can be defined as those activities that facilitates the efficiency of the primary activities in the value chain. Porter (1985) defines the following as supportive activities:

- Firm infrastructure
- Human resource management
- Technology development
- Procurement

Tomra has an inhouse department for accounting, customer relation management as well as human resources management. The research and development department is located in China, where most of the company's supplies are purchased.

### 5.1.3 Corporate strategy direction

Tomra's market development is mainly due to provision of existing products to new markets. Both the RVM- and the Sorting-market is considered B2B markets, localized in Scandinavia, Northern America, Europe and Australia. Tomra earns 96 % of its revenue outside of its home country, Norway. From this perspective Torma should be considered a multinational company, and their international strategy is based on expansion in to new markets with their current product portfolio. To succeed at an international scale, Tomra is dependent on a set of international drivers to be beneficial. These drivers are: Market drivers, Cost drivers, Government drivers and Competitive drivers.

Market drivers indicates to which degree the market is transferable between different countries. The main themes are similar customer needs, transferable marketing and global customers. The need for RVM is present in every country with a market for beverages sold in bottles or cans.

From this perspective, the entire world has a similar need for recycling systems. This is, however, especially relevant for countries with a focus on the environment and green economy. Tomra has RVMs designed for use in small stores as well as big hypermarkets. This means that there is a potential for RVMs in every grocery store located in places where waste management systems are in demand. The need for sorting systems applies to customers gaining benefits from using them. This should be relevant across borders.

From a cost perspective, scale economy and favorable logistics is of utmost importance. Economy of scale is defined as the reduction of production cost per unit as production is increased (Carlton & Perloff, 2015). Tomra does its R&D activities in addition to production and sourcing, in a low-cost country. Tomra has been operating in China since 2010 and currently employs 150 people in the country. Due to the cost benefit, almost 50 % of the world's goods are produced in Asia, which means that production in Asia is important to stay competitive in the world economy.

Governmental drivers relate specifically to which markets Tomra decides to enter. For Tomra to consider entering, a new country regulation for bottle recycle must be under legislative evaluation. Deposit schemes has proven to be the most efficient system to increase the rate of bottle recycling. Quebec, Canada, Scotland and Spain are currently being monitored as potential new markets for this reason. Scotland has committed to a Container Deposit Scheme announced in party program. There are regional initiatives ongoing in Spain and Quebec is possibly expanding its current deposit system. In March 2018 the Department for Environment, Food & Rural Affairs in the United Kingdom made a press release stating that a deposit return scheme (Department for Environment, Food & Rural Affairs, 2018). This marks the potential of a sudden new market of significant size. The United Kingdom being similar to Germany in regard to population and wealth makes Germany a close proxy for how an entry to the British market could affect Tomra.

### 5.1.4 Mode of entry, market maturity and growth

Tomra has over the past years averaged 17 % organic growth in revenues annually. In the same time period, they have completed a series of acquisitions and set up a series of joint ventures. Their preferred mode of entry in new RVM segments is through joint venture. In Australia Tomra is partnered with Cleanaway, while INCOM TOMRA RECYCLE and ERMAX are their partners in China and Poland respectively. Through these joint ventures Tomra has made OEM-agreements (original equipment manufacturer) with the partnering firm. An OEM agreement indicates that Tomra is manufacturing the components and installs them under the name of the

partnering firm. RVMs installed per this agreement, are not listed in the total number of installed machines.

Tomra divides its sorting operations into three business segments: mining, recycling and food-sorting. The three business areas can be analyzed by the degree of diffusion of technology in their segment. Based on a life cycle curve, the use of sensor-based sorting equipment in the mining segment is in an early developed stage. Tomra's technology is in use to separate minerals from ordinary rocks. The mining segment is, according to analysis by Tomra in a developing stage. Highly developed technology is still quite rare in the mining segment which implies a big market opportunity in this segment. The recycling segment, is in at high growth stage along with the food sorting market.

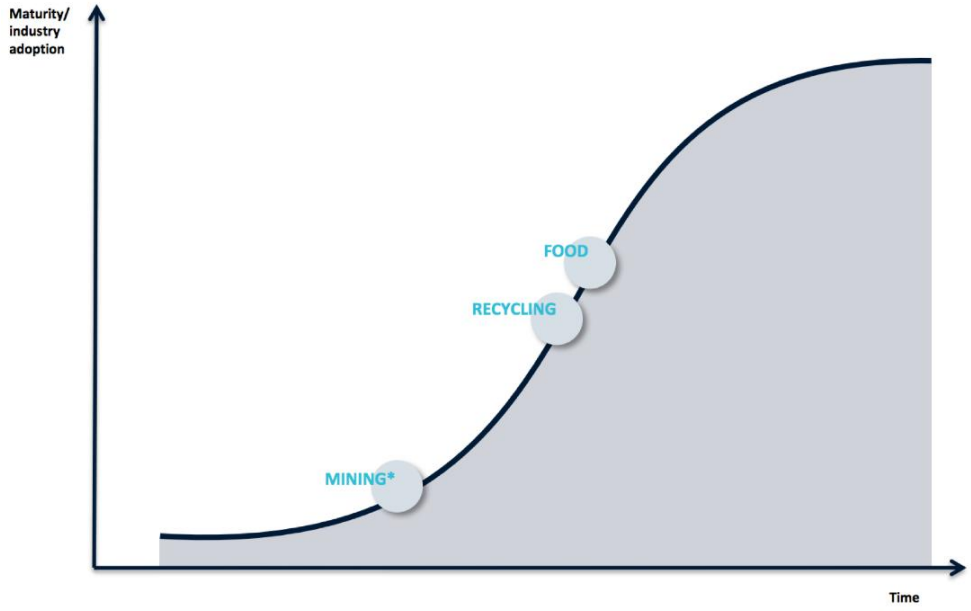


*Figure 4: Market maturity of sorting-based solutions (Tomra, 2018).*

Based on the model, all three segments show potential for future growth in the demand for advanced technology. From this perspective, we have used this model as the baseline for how we expect these business segments to grow in the future.

## 5.2 PESTEL

The purpose of the PESTEL-analysis is to enlighten the environment in which Tomra operates. The letters represent political, economic, social, technological, environmental and legal factors in a macro perspective. (Johnson, Whittington, Regnér, & Angwin, 2014)

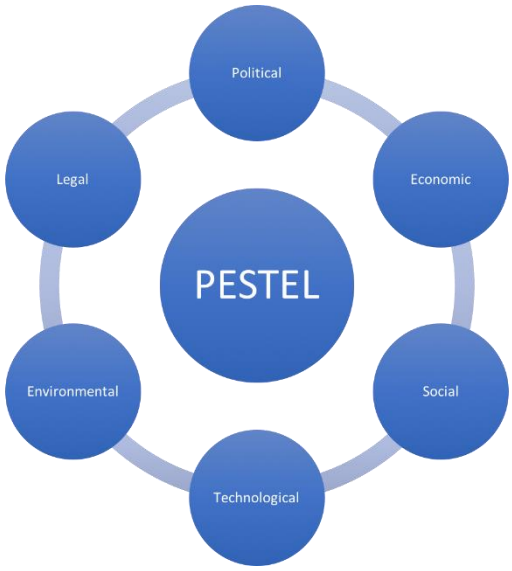


*Figure 5: PESTEL framework*

### 5.2.1 Political

The Paris agreement is an agreement signed by 195 countries that aims to hold the increase in global average temperature well below 2 °C above pre-industrial level and pursue efforts to limit the temperature increase to 1,5 °C above pre-industrial level. Furthermore, the agreement aims to reach "peaking of greenhouse gas emission as soon as possible". The Paris agreement which is taken in effect from 2020.

These key principles show the common political ambitions for the EU region. Tomra closely monitors the competition from land fillings, incineration, separate collection systems, scavengers and hand sorting.

Each year 1.2 million dollars is donated to state legislators by anti-Container-Deposit Legislation (CDL) lobbyists. The majority of this is funded by large beverage producers. The reason for this anti deposit lobby, is because of the perceived price increase on each bottle sold. The beverage producers argue that this affects their revenue. The economic theory of price elasticity states that the change in quantity sold is larger than the change in price. Thus, the lobbyist expects a reduction in sale larger than the extra cost per beverage container. Before entering the German market, the deposit legislation went through trial on two levels in the German court system.

### 5.2.2 Economic

The overall economy is an influential factor for operators within waste management. Environmental focus is likely to diminish if the economy hits a recession. On the contrary,

during periods of high economic growth we expect a growing focus on concerns regarding the environment.

Changes in raw material prices is likely to be an influencing factor on a macro environment level. Especially aluminum is of relevance. The cost of producing aluminum from scrap material is 95 % cheaper compared to raw production, fueling the incentive to recycle cans and other materials.

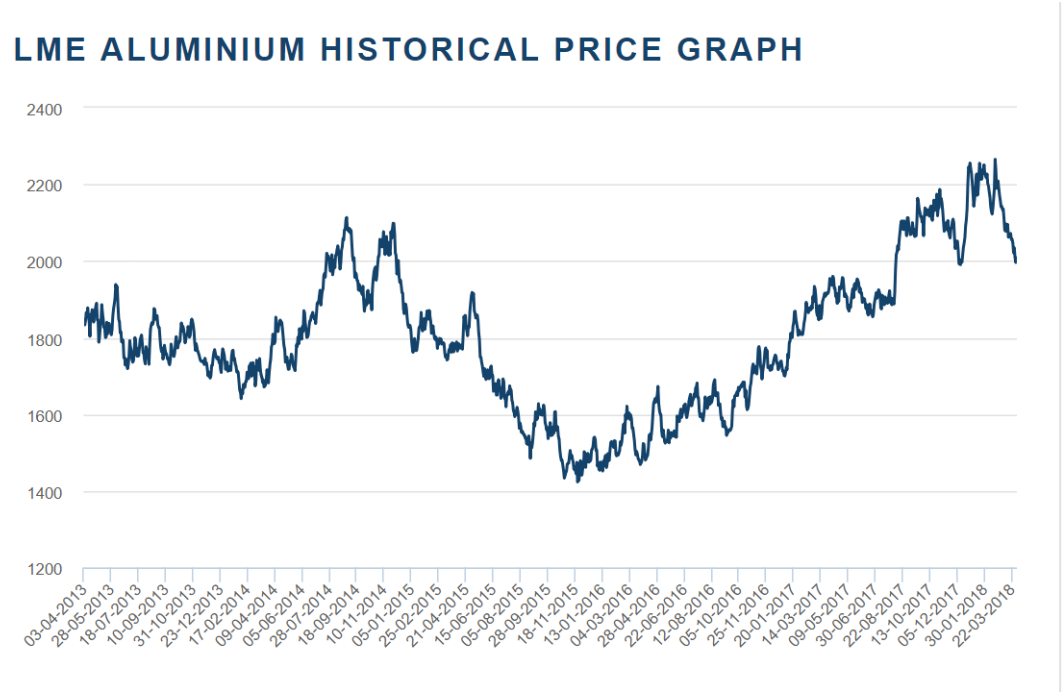


*Figure 6: Historical aluminum price 2013-2018. (London Metal Exchange, 2018).*

Figure 6 is denominated in USD pr. tonne. The chart shows the historical price of aluminum for the time period 2013-2018. Changes in commodity prices influences the attractiveness of recycling changes as well. In 1985 Tomra was near bankruptcy due to a sudden drop in aluminum prices. This shows the risk a company faces by being exposed to commodity prices.

Currency risk is a risk factor for a company that operates in, and has revenues streams from multiple countries. As currencies fluctuate, the competitiveness of a company could diminish or disappear due to an unfavorable change in currency rates. With significant revenues denominated in USD and costs in EUR and NZD, Tomra Sorting is exposed to the USD/EUR and USD/NZD currency rates.

### 5.2.3 Social

The general population is an important social factor. The middle class is most frequent consumers of bottled drinks regarded in an economic context. The middle class is defined as the social group between the upper and working classes, including professional and business people and their families. This group is expected to grow by 3 billion people by 2030. To accommodate for the upcoming increase in consumption, about $ 1,1 trillion is spent annually on resource subsidiaries. Additionally, $1 trillion needs to be invested in resource systems to meet future demand (Richard, Oppenheim, & Thompson, 2012)

### 5.2.4 Technological

Advanced technology is implemented in both collection and sorting solutions. To compete in the technological development, Tomra is investing up to 8 % of yearly revenue in R&D (Tomra Systems ASA, 2018a). In the world of technology, implementation and development of artificial intelligence (AI) and machine learning is increasingly more important. These technologies are being used in a growing number of sectors and businesses. These are expected to overtake most repetitive activities previously done manually by humans. AI is used in the sorting machine Nimbus made by Tomra and used for food sorting and connected to cloud technology.

The smart phone revolution makes interacting with machines easier. At the same time, there are apps developed for nearly all kinds of purposes. Apps makes interacting with machines easier as well as they can store relevant customer information. To partake in this evolution, Tomra has developed the TOMRAplus software and TOMRAreact/panto app.

### 5.2.5 Environmental

The world is victim of severe $CO_2$ emission from human activities. This is argued to be the main cause of global warming. As a global problem, the world is required to take actions in order to control the human created climate change.

By shifting focus from a linear value chain, life cycle assessment is used to create a more circular view of the value chain. Principles of circular economy includes:

- Design out waste and pollution.
- Keep products and materials in use.
- Regenerate natural systems.

Domestic and industrial waste is considered valuable resources. If handled correctly, it can provide substantial benefit and value. The ISO 14000 is a series of standards aimed towards environmental management. The goal is to minimize an organization's impact on the environment by providing organizations with tools and guidelines according with laws, regulations, and other environmentally oriented requirements.

Plastic pollution both on land and sea is of a growing concern for the environment. Approximately 10-20 million tons of plastics end up in the ocean annually and it's estimated that 5,25 trillion plastic particles currently float in the world's oceans (Gourmelon, 2015). All these factors can prove beneficial, from a business perspective, to environmentally-focused companies like Tomra.

### 5.2.6 Legal

With regards to Tomra, the most influential variable on a macro level is the legal factor for Container-Deposit Legislation (CDL, also known as a deposit-refund system, bottle bill, or deposit-return system). This law implies monetary deposit on each bottle redeemed by recycling. In order for Tomra Collection to even consider entering a market, the CDL has to be approved. The market will then develop a demand of their reverse-vending machines. When adopting CDL, a fee is applied to every bottle sold. This creates economic incentive to recycle the empty bottle. This legislation is implemented to encourage the recycling of beverage containers and to reduce littering. Based on research by the Container Deposit institute (Gitlitz, 2013), the recycling of aluminum cans was twice the amount in American states with an established CDL, when comparing to non-deposit states in the US. This shows the impact that legal bills have on the rate of recycling. Also in the EU region CDL has proven as the most efficient measure for recycling, with the top 5 countries reaching an average 94 % rate of PET-bottles recycled. Queensland, Australia plans to implement this legislation by July 2018. Western Australia is expected to follow 2019, and United Kingdom announced in 2018 that they will review the possibility for implementation. Quebec, Canada and Spain are among other countries and states in the talks of implementing this system.

The EU has revised a waste proposal that states the following key elements:

- A common EU target for recycling 65% of municipal waste by 2030.
- A common EU target for recycling 75% of packaging waste by 2030.
- A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2030.

- A ban on landfilling of separately collected waste.
- Promotion of economic instruments to discourage landfilling.
- Simplified and improved definitions and harmonized calculation methods for recycling rates throughout the EU.
- Concrete measures to promote re-use and stimulate industrial symbiosis –turning one industry's by-product into another industry's raw material.
- Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (e.g for packaging, batteries, electric and electronic equipment, vehicles).

(European Commission, 2017)

These factors show indications for a megatrend in the global economy. Industries and enterprises are required to implement a focus on green production and life cycle analysis for their product. As waste management is considered as an integral part of the value chain in circular economy, this opens for potential great business opportunities.

## 5.3 Porters 5 Forces

According to Porter (1979) competition in an industry depends on 5 basic forces. These are:

- Threat of new entry
- Threat of substitution
- Competitive rivalry
- Buyer power
- Supplier power

We have utilized this framework to analyze each business area separately. We will weight each area independently, and from this make a total evaluation of the competitive landscape Tomra currently operates in.

### 5.3.1 Threat of new entry

Threat of new entry refers to which degree new entrants can enter completely new markets. This is motivated by profit. Both the reverse vending and sorting business is driven by highly specialized and advanced technology designed for this particular purpose. For this reason, new entrants will have to invest largely in developing the required competence and technology to compete with the established actors. The industry consists of a few large corporations, which most likely can outcompete new entrants. If, and when new markets with deposits schemes

opens, we expect new entrants to rise and try to compete in this new market. The sorting segment is also dominated by large companies with similar market shares as Tomra. Tomra is well established as one of the largest providers of sorting solutions in the world, though less dominant in this segment. We therefore consider the threat of new entry to be low.

### 5.3.2 Threat of Substitutes

Threat of substitutes refers to whether the product or service can be substituted by something similar to the current product. The strength of the substitute is determined by the degree of applicability and to which degree the customer is willing to adopt the substitute (Porter, 1985). The RVM business is dominated by Tomra. From a business standpoint, collection of bottles is a monotonous job and best left for machines to handle. However, a Chinese study concluded that scavengers and informal collectors did compete with the RVM system in Beijing (Zhang & Wen, 2014). The scavenging process is done by individuals who collect bottles and cans from private consumers and general waste. This is sold, by the weight, to companies that creates new bottles or reuse the old bottles. The scale of informal collection and scavengers is small compared to the volume collected by the Tomra machines. With over 81000 installed machines worldwide, the threat from substitutes is perceived as insignificant and therefore very low in the sense of Porter's five forces. Regarding the sorting segment, the only feasible substitute is manual labor. This alternative applies only to smaller customers which gain no or limited benefits advantages from using automated systems. We therefore consider the overall threat of substitutes to be low.

### 5.3.3 Competitive rivalry

Tomra is the largest company in the RVM market with a market share of 75 %. Having this position makes Tomra the market leader with few competitors. In the RVM market there are 5 companies who have installed over 500 machines on a global scale. Comparing this to Tomra's 75.000, the threat from competitors is present and should be monitored. However, it is not a critical objective as of today. Their biggest competitor in the RVM-market is the German-American company Diebold Nixdorf, with 10.000 machines installed in 15 different markets.

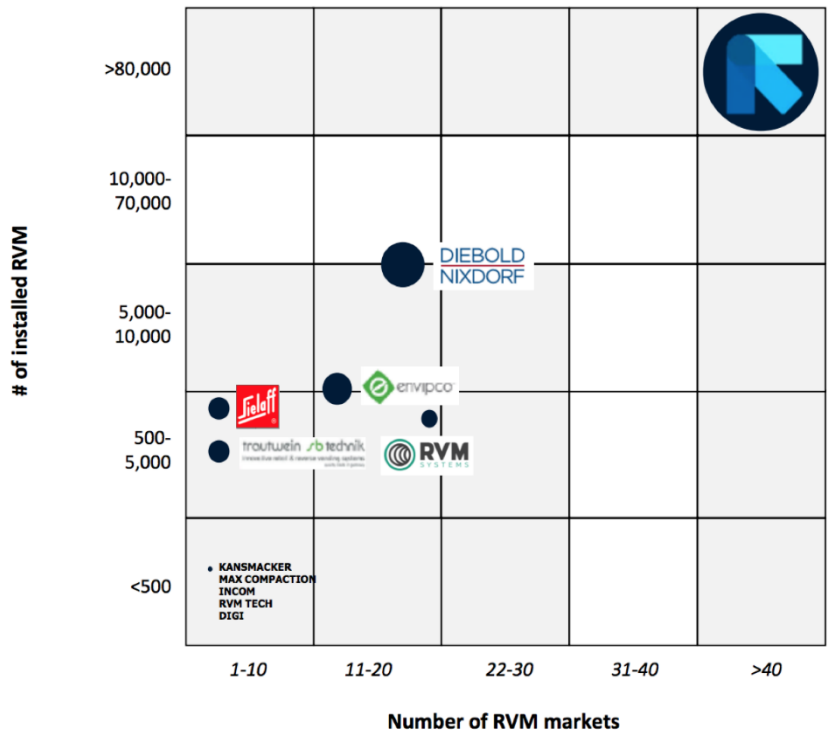


*Figure 7:RVM segment, competitive environment, (Tomra systems ASA, 2017b)*

Tomra has an estimated market share of 60 % in the recycling segment, and 45 % in both the food and mining segments within the sorting market. With a growing focus on waste management and technology-based solutions, new markets are to be expected When new markets emerge, we expect a growth in competition. The reason for this is that this industry has a huge potential for profit, and competition for market shares will increase. Currently, the largest competitor in the sorting segment is the Swiss company Buhler Sortex. Our overall assessment implies that competition is at a moderate level, but can grow in the future.

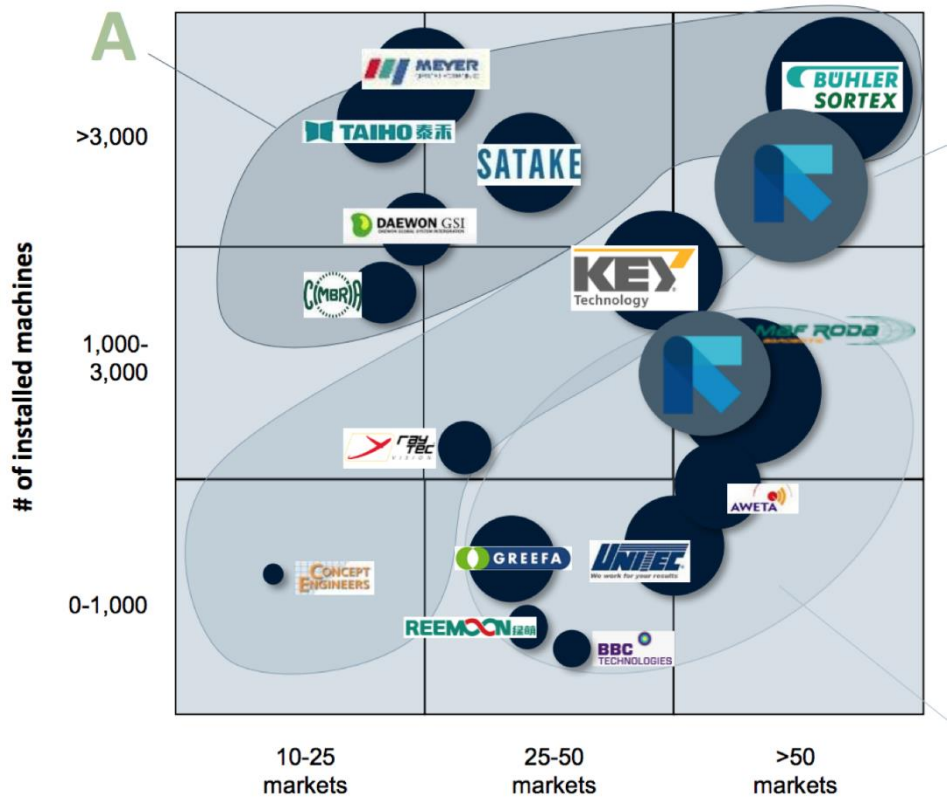


*Figure 8: Food sorting, competitive environment. (Tomra Systems ASA 2017b)*

### 5.3.4 Threat from suppliers

Tomra is sourcing its materials from a global scope. The distribution of sourced materials was in 2016: 40% Asia, 20 % Eastern Europe and 40 % Rest of World. This distribution is based on cost of goods sold. Based on their sourcing strategy of having a standardized and cost optimized product portfolio the threat from suppliers is regarded as very low.

### 5.3.5 Threat from customers

Tomra's RVMs are capable of providing recycling solutions to small stores, supermarkets and recycling stations. The optimal reverse vending system is dependent on collection volume, bin handling logistics and the available space. Deviations from this means that Tomra has to provide solutions fitted for each customer's need. In the RVM segment, the customer is mainly grocery retailers. Only the large retail chains will have the opportunity to influence Tomra in any significant way. The largest companies can affect Tomra through negotiations regarding large purchases and contracts. Tomra delivers sorting solutions to food growers, packaging and processing facilities in the food sorting segment. Metal recovery facilities, metal shredder operations and scrap dealers are the main customers in the recycling business, while mining companies are served in the mining industry. By having a diversified customer portfolio, the

risk of losing large contracts is regarded as moderate, given Tomra's quality products and high market shares in each segment. The overall threat from customers is therefore considered as low.

### 5.3.6 Competitive summary

To sum up the competitive landscape, a moderate threat of competitive rivalries represents the biggest concern to Tomra. We expect the growing focus on resource management to increase the attractiveness of this industry. This will fuel growth in competition from existing actors and, to some degree, new entrants.

## 5.4 VRIO

VRIO is a framework used to determine the value, rarity, imitability and organizational support of an organization's resources and capabilities (Johnson, Whittington, Regnér, & Angwin, 2014). Each classification is defined as following:

| | |
|---|---|
| V | **Value:** Do resources and capabilities exist that are valued by customers and enable the organisation to respond to environmental opportunities or threats? |
| R | **Rarity:** Do resources and capabilities exist that no (or few) competitors possess? |
| I | **Inimitability:** Are resources and capabilities difficult and costly for competitors to obtain and imitate? |
| O | **Organisational support:** Is the organisation appropriately organised to exploit the resources and capabilities? |

*Figure 9: VRIO framework.*

## 5.5 Technology

Tomra possesses several resources which are important in order to maintain current, and capture new market shares. Most important is the technology used in reverse vending machines and sorting solutions. This is used to develop advanced and highly specialized equipment.

The value lies in technology's ability to create value for its users. By using Tomra solutions, businesses have the ability to increase the amount of materials it can recover from a material stream of waste. The value of increased purity of the material stream represents an additional advantage. By sorting waste efficiently and automatically the technology can provide the correct material for further re-use at a reduced operational cost.

The rarity aspect of VRIO refers to whether the resource is possessed by few or no other competitors. As Tomra's technology is unique and has been developed over time, it should be considered as rare. However, competitors do have their own solutions which work in a similar

way. This deals with the degree of imitability of the resource. The complexity of Tomra's technology is possible to copy by competitors. To stay in front of the competitors, Tomra should constantly renew and evolve their technology.

The organization is structured with Tomra Systems ASA as parent the company and subsidiaries for each business segment and location. This gives each subsidiary autonomy to run its operations in accordance with local regulations and requirements. By having the R&D department and production sites in China, the company has the correct support and conditions to maintain and develop its competitive advantages. Tomra spends on average 8 % of its revenue on R&D activities, which testifies of a strong organizational support.

## 5.6 Patents

As of 31. January 2018, Tomra has filed for more than 80 patents (Tomra Systems ASA, 2018c). These are closely related to technology. Tomra patents inventions that are meant to create value for the company. These patented inventions are often incremental improvements to their current machines. One example is the new laser technology, which allows their machines to separate objects based on their shape. These inventions are rare, since Tomra is the inventor. Imitability will last over the duration of the patent. When the patent expires, other companies are likely to copy a successful invention. That means the imitability of the patent is limited, but not everlasting. Tomra's expenditure on R&D activities are yet again proof of organizational support of the capability.

## 5.7 Brand

Tomra has been an innovator within the collection segment. Their continuous development and production of high-quality equipment has increased the value of the brand, which is reflected by their current position in the market. Operations in the sorting segment has become increasingly dominant, as shown in figure 10.

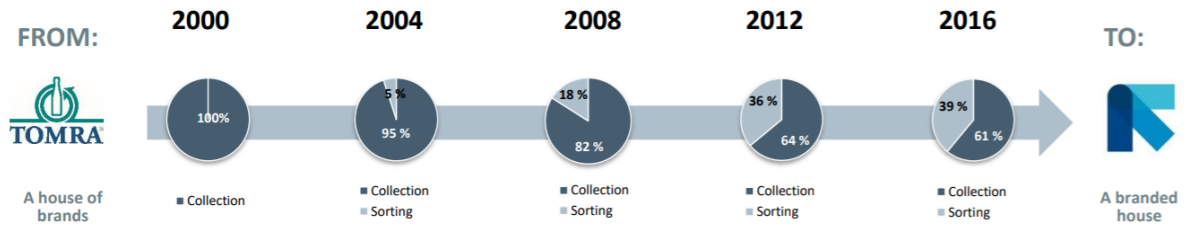


*Figure 10: Operating areas. Source: (Tomra Systems ASA, 2017b)*

Tomra has transferred the brand value to the sorting segment by applying the Tomra brand to all operating areas. Their pioneering activities strengthens and promotes the rarity aspect of the brand. This resource is considered inimitable, unless a rivaling company revolutionizes the process of recycling bottles and cans. We consider this as highly unlikely at the time of writing. Again, the transition from a house of brands to a branded house witness of a strong organizational support on enforcing the brand.

## 5.8 Business expansion

Tomra has a long history of acquiring companies. In 2017, sorting company Compac was acquired to expand sorting activities into New Zealand. In 2018 Tomra continued expanding in this new market through acquisition of New Zealand-based BBC technologies. Rivaling companies within the collection solutions do not match the buying power of Tomra. In the case of a new market opening, Tomra is in a strong position to dominate this. However, most of their recent acquisitive activity has been within the sorting solutions. As we discussed in the industry analysis, Tomra faces fiercer competitive rivalry in this segment. Their competitors are in a good position to expand into new markets and product lines. Especially Buhler Group has proven a shrewd buyer of subsidiaries.

There is no doubt that the ability to acquire companies has proved valuable for Tomra. While this is a rare intangible capability within the collection segment, competitors in the sorting segment also possess this capability. That means it also can be imitated by their competitors. Lastly, a large share of Tomra's current growth is due to acquisitions. In other words, expansion activities are supported by the organization.

## 5.9 SWOT

To conclude the strategic analysis, we have chosen to use a SWOT-analysis to sum up the most important strategic factors. A SWOT-analysis is used to map Strengths, Weakness, Opportunities and Threats. We believe that Tomra is well positioned in a growing business segment and clear competitive advantages. Based on the diffusion of technology, we expect the sorting segment to continue a high growth period for up to ten years before entering a stable growth period. As Tomra collecting solutions being highly dependent on governmental regulations, the future of this market is difficult to predict. We expect Tomra to enter any market that chose to implement a deposit schemes, but future revenue from this segment is mostly generated from replacement of older RVM models, service and maintenance.

| | |
|---|---|
| **Strengths:**<br>• **Large market share**<br>• **Diversified**<br>• **Advanced technology** | **Weaknesses:**<br>• **Currency exposure** |
| **Opportunities:**<br>• **Megatrend in waste management**<br>• **Artificial Intelligence** | **Threats:**<br>• **Highly dependent on governmental regulations** |

*Figure 11: SWOT*

# 6 Historical and restructured annual statements

Historical statements are advantageous to creditors when they analyze a company's ability to repay loans. Our purpose is to analyze Tomra from an investors perspective. Without proper restructuring of the accounting numbers, the analysis will not be sufficiently precise (Gjesdal, 2007). The focus of this part is to adjust and sort numbers from historical annual statements to fit an investor based analysis. For example, abnormal items should be separated from the rest, as we cannot anticipate these items to occur in the future.

Lastly, it is important to adjust earnings and the balance sheet for measurement errors. Tomra presents their annual reports under the IFRS standard. The outcome of this chapter will create a better foundation for estimation of future cash flows.

## 6.1 Level and scope of analysis

Ideally the analysis would be conducted on statements separated by business areas. This would have given better insights and basis a of evaluation of each area's profitability and performance. However, Tomra's accounting numbers are not separated to fit this approach. We have therefore chosen to analyze the whole company at once. We believe the alternative would have led to imprecise extrapolation and guesswork, causing overall more harm than good to the quality of the estimates.

Our strategic analysis revealed that Tomra is currently operating in a high competition environment in the sorting market, while the collection market is heavily reliant on politics and environmental legislation. The collection market has expanded with varying pace during the last years. Common for both markets are the focus on sensor-based technology. This adds to the perception of Tomra operating in technology driven environments where innovation plays a major factor. With so many contingencies and hidden opportunities present, the scope of the analysis is therefore set to 5 years. It is necessary to include and emphasize the last available public annual statement in the analysis, to better display the current situation of the company. Our period of analysis includes all public statements from 2013 to 2017. We have also included the 2012 numbers to calculate and analyze ratios for 2013. Earnings is the most important item from the annual reports when estimating free cash flows. Damodaran (2012) recommends using a trailing 12-months estimate if a quarterly report is the last available. However, quarterly reports are often consolidated, and provide an unstable foundation for valuation. Our analysis includes the latest annual report (2017), as this contains the most up-to-date financials.

## 6.2 Annual reports 2012-2017

In this section, annual reports from the last 6 years are presented. The numbers are given in thousands and are denominated in NOK. Some estimation error may occur due to rounded numbers, but we do not expect it to have any impact on our analysis.

| Income Statement - As Reported | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Operating revenues | 4073.1 | 4602.1 | 4749.0 | 6142.9 | 6609.9 | 7432.1 |
| Cost of goods sold | -1605.5 | -2018.6 | -2055.1 | -2749.2 | -2829.3 | -3243.2 |
| Employee benefits expenses | -1143.8 | -1262.0 | -1350.8 | -1666.2 | -1847.4 | -2198.5 |
| Ordinary depreciation | -229.0 | -258.3 | -260.1 | -303.3 | -342.9 | -374.2 |
| Other operating expenses | -432.9 | -462.2 | -455.5 | -533.5 | -602.6 | -700.7 |
| Total operating expenses | -3411.2 | -4001.1 | -4121.5 | -5252.2 | -5622.2 | -6516.6 |
| Operating profit/EBIT | 661.9 | 601.0 | 627.5 | 890.7 | 987.7 | 915.5 |
| | | | | | | |
| Financial income | 10.0 | 8.0 | 18.6 | 9.7 | 62.7 | 32.8 |
| Financial expenses | -48.6 | -54.5 | -46.1 | -42.5 | -46.5 | -56.5 |
| Net financial items | -38.6 | -46.5 | -27.5 | -32.8 | 16.2 | -23.7 |
| | | | | | | |
| Profit from associates | 7.1 | 6.6 | 3.4 | 8.1 | 4.2 | -4.7 |
| Result before taxes from continuing operations | 630.4 | 561.1 | 603.4 | 866.0 | 1008.1 | 887.1 |
| Taxes | -152.7 | -139.0 | -148.4 | -211.6 | -256.9 | -229.3 |
| | | | | | | |
| Loss / profit from discontinued operations | 0.0 | -9.7 | -60.7 | -6.7 | -12.9 | 0.0 |
| Profit for the period | 477.7 | 412.4 | 394.3 | 647.7 | 738.3 | 657.8 |
| Attributable to: | | | | | | |
| **Shareholders of the parent** | **440.4** | **376.7** | **360.9** | **600.8** | **691.2** | **610.7** |
| Non-controlling interest | 37.3 | 35.7 | 33.4 | 46.9 | 47.1 | 47.1 |
| Profit for the period | 477.7 | 412.4 | 394.3 | 647.7 | 738.3 | 657.8 |
| EPS | | | | | | |
| Basic | 3.0 | 2.6 | 2.4 | 4.1 | 4.7 | 4.1 |
| Continuing operations | 3.0 | 2.6 | 2.9 | 4.1 | 4.8 | 4.1 |
| Diluted | 3.0 | 2.6 | 2.4 | 4.1 | 4.7 | 4.1 |
| Continuing operations | 3.0 | 2.6 | 2.9 | 4.1 | 4.8 | 4.1 |
| | | | | | | |
| **Other comprehensive income** | | | | | | |
| Profit for the period | 477.7 | 412.4 | 394.3 | 647.7 | 738.3 | 657.8 |
| | | | | | | |
| Other comprehensive income that may be reclassified to profit or loss | | | | | | |
| Foreign exchange translation differences | -142.9 | 300.3 | 368.3 | 352.2 | -175.4 | 138.5 |
| Other comprehensive income that will not be reclassified to profit or loss | | | | | | |
| Remeasurements of defined benefit liability (assets) | 0.0 | -40.9 | -13.8 | -0.5 | -3.8 | -41.8 |
| Tax on remeasurements of defined benefit liability (assets) | 0.0 | 13.9 | 3.7 | 0.1 | 0.9 | 6.1 |
| Total comprehensive income for the period | 334.8 | 685.7 | 752.5 | 999.5 | 560.0 | 760.6 |
| Attributable to: | | | | | | |
| Shareholders of the parent | 302.9 | 643.2 | 700.8 | 931.2 | 516.9 | 721.4 |
| Non-controlling interest | 31.9 | 42.5 | 51.7 | 68.3 | 43.1 | 39.2 |
| | | | | | | |
| Total comprehensive income for the period | 334.8 | 685.7 | 752.5 | 999.5 | 560.0 | 760.6 |

*Table 3: Income statement 2012-2017.*

| Balance sheet - As reported | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Assets | | | | | | |
| Deferred tax assets | 127.3 | 134.3 | 156.0 | 219.6 | 217.7 | 282.2 |
| Goodwill | 1793.1 | 1965.3 | 2051.0 | 2211.5 | 2108.1 | 2604.8 |
| Developement costs | 56.4 | 77.0 | 85.6 | 98.8 | 109.8 | 187.1 |
| Other intagible assets | 318.8 | 310.2 | 330.0 | 360.6 | 314.3 | 337.9 |
| Total intangible non-current assets | 2168.3 | 2352.5 | 2466.6 | 2670.9 | 2532.2 | 3129.8 |
| Propert, plant and equipment | 381.5 | 421.5 | 474.9 | 529.6 | 505.9 | 627.4 |
| leasing equipment | 181.6 | 186.4 | 208.0 | 308.3 | 294.8 | 370.5 |
| Total tangible non-current assets | 563.1 | 607.9 | 682.9 | 837.9 | 800.7 | 997.9 |
| Investment in associates | 36.1 | 42.1 | 55.5 | 68.5 | 69.8 | 78.9 |
| Other investments | 0.7 | 0.8 | 3.7 | 1.9 | 1.3 | 1.3 |
| Long term receivables | 219.8 | 223.7 | 248.1 | 245.3 | 271.5 | 268.7 |
| Total financial non-current assets | 256.6 | 266.6 | 307.3 | 315.7 | 342.6 | 348.9 |
| Total non-current assets | 3115.3 | 3361.3 | 3612.8 | 4044.1 | 3893.2 | 4758.8 |
| Inventory | 788.5 | 873.5 | 912.9 | 1209 | 1126.9 | 1197.2 |
| Trade receivables | 845.8 | 931.1 | 1188.2 | 1363.4 | 1320.9 | 1468.6 |
| Other short-term receivables | 232.2 | 293.2 | 348.7 | 387.8 | 374.6 | 419.0 |
| Total receivables | 1078.0 | 1224.3 | 1536.9 | 1751.2 | 1695.5 | 1887.6 |
| Cash and cash equivalents | 177.2 | 164.1 | 436.3 | 312.9 | 399.2 | 593.5 |
| Assets held for sale | 0.0 | 0.0 | 125.8 | 0.0 | 0.0 | 0.0 |
| Total current assets | 2043.7 | 2261.9 | 3011.9 | 3273.1 | 3221.6 | 3678.3 |
| | | | | | | |
| Total assets | 5159.0 | 5623.2 | 6624.7 | 7317.2 | 7114.8 | 8437.1 |

| Balance sheet - As reported | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Liabilities and equity | | | | | | |
| Share capital | 148.0 | 148.0 | 148.0 | 148.0 | 148.0 | 148.0 |
| Treasury shares | -0.2 | -0.2 | -0.2 | -0.4 | -0.5 | -0.5 |
| Share premium reserve | 918.3 | 918.3 | 918.3 | 918.3 | 918.3 | 918.3 |
| Paid-in capital | 1066.1 | 1066.1 | 1066.1 | 1065.9 | 1065.8 | 1065.8 |
| Retained earnings | 1217.2 | 1674.8 | 2177.9 | 2879.2 | 3126.5 | 3528.3 |
| Non-controlling interest | 73.6 | 82.6 | 115.4 | 160.4 | 177.7 | 143.3 |
| Total equity | 2356.9 | 2823.5 | 3359.4 | 4105.5 | 4370.0 | 4737.4 |
| Defererred tax liabilities | 121.5 | 97.4 | 140.3 | 124.2 | 97.5 | 114.2 |
| Pension liabilities | 32.6 | 69.6 | 83.2 | 87.8 | 83.0 | 111.2 |
| Long-term Interest-bearing liabilities | 1546.1 | 1004.4 | 1558.2 | 1206.4 | 759.7 | 1280.1 |
| Other long-term liabilities | 0.0 | 0.0 | 34.8 | 62.3 | 73.3 | 149.0 |
| Total non-current liabilities | 1700.2 | 1171.4 | 1816.5 | 1480.7 | 1013.5 | 1654.5 |
| Short term interest-bearing liabilities | 5.6 | 552.1 | 90.4 | 0.0 | 0.0 | 0.0 |
| Trade payables | 294.5 | 321.6 | 439.5 | 498.8 | 440.5 | 552.8 |
| Intra-group debt | | | | | | |
| Income tax payable | 65.6 | 64.7 | 57.2 | 179.2 | 144.6 | 77.0 |
| Provisions | 129.8 | 132.4 | 96.8 | 146.0 | 138.2 | 147.4 |
| Other current liabilities | 606.4 | 557.5 | 740.5 | 907.0 | 1008.0 | 1268.0 |
| Liabilities held for sale | | | 24.4 | | | |
| Total current liabilities | 1101.9 | 1628.3 | 1448.8 | 1731.0 | 1731.3 | 2045.2 |
| Total liabilities | 2802.1 | 2799.7 | 3265.3 | 3211.7 | 2744.8 | 3699.7 |
| | | | | | | |
| Total assets and liabilities | 5159.0 | 5623.2 | 6624.7 | 7317.2 | 7114.8 | 8437.1 |

*Table 4: Balance sheet 2012-2017.*

## 6.3 Restructuring the annual statement

Restructuring of the annual report requires the analyst to:

- Handle “dirty surplus”.
- Separate operating and financial items.
- Separate normal and abnormal items.
- Distribute tax expenses.
- Separate operating and non-operating assets.

- Separate interest bearing and interest-free liabilities.

### 6.3.1 Income statement

Pronobis & Zülch (2010) Describes "Dirty surplus" the booking of certain transactions directly into equity instead of the income statement. This is a violation of "kongruensprinsippet", RL §4-3 (Finansdepartementet, 1998). The negative effects of "dirty surplus" is that some of the income or expenses are excluded from the bottom line. Companies reporting through the IFRS have an additional element in the income statement known as other comprehensive income (OCI). This statement includes items as foreign exchange translation differences and remeasurements of defined benefit liabilities. These are items that are known as "dirty surplus" because they are a part of the company's retained earnings, but not reported as "clean surplus". Penman (2013) states that dirty surplus rarely is a problem in IFRS statements, as it is included in the OCI statement. We have not identified any dirty surplus in addition to that reported in the OCI. Therefore, the total net result remains the same as reported in the income statement.

We can now proceed with separation of normal and abnormal items. At the same time, we will separate operating and financial items to prepare the statement for analysis. Abnormal items are items that cannot be expected to occur in future periods. Inclusion of these will lead to an inaccurate analysis. Damodaran (2012) claims there are 4 types of such items:

- One-time expense or income that is truly "one time".
- Expenses and income that do not occur every year, but seem to recur at regular intervals.
- Expenses and income that recur every year but with considerable volatility.
- Items that recur every year that change signs: positive in some years and negative in others.

The notes in the annual statements provide valuable insight for determining whether items are normal or abnormal. We do not find any evidence of abnormal items related to the operating revenues and expenses from the mother company. All these items are increasing at a steady rate, which can be expected from a growing company. Profits from associates has shown negative profit in 2017. There may be different challenges and environments facing the associates. These will be treated as a unique item, separate from the classification.

All items in the OCI clearly fit with several of the descriptions for abnormal items. They are volatile and changing signs. The majority of the OCI originates from foreign exchange translation differences. These are difficult, if not impossible to forecast. The remaining OCI is made up by remeasurements of defined benefit liability and related taxes. These items do not

occur every year, and are also hard to predict. Both are related to the day to day operations of the company.

A detailed overview of financial items is provided appendix 1. Interest income and expenses are normal items in completeness. The "other financial income" item has appeared only once in our period of analysis. We will treat this as an abnormal item. Foreign exchange gains and losses make up a significant part of financial items. "The foreign exchange gain in Tomra Systems ASA relates mainly to loans in EUR and realized gain on forward exchange contracts." (Tomra Systems ASA, 2018a). These change signs from year to year, which is why we will treat them as abnormal. Loss/profit from discontinued operations are financial items. These are not relevant when estimating future earnings. They are therefore classified as abnormal. Table 5 shows the normal and abnormal operating and financial items.

| Operating-Normal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Operating profit/EBIT | 661.9 | 601 | 627.5 | 890.7 | 987.7 | 915.5 |
| Total normal pre-tax operating profit | 661.9 | 601 | 627.5 | 890.7 | 987.7 | 915.5 |
| Profit from associates | 7.1 | 6.6 | 3.4 | 8.1 | 4.2 | -4.7 |
| | | | | | | |
| Operating-Abnormal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Foreign exchange translation diff. (OCI) | -142.9 | 300.3 | 368.3 | 352.2 | -175.4 | 138.5 |
| Net remeasurements of defined benefit liability (OCI) | 0 | -27 | -10.1 | -0.4 | -2.9 | -35.7 |
| Total abnormal operating profit | -142.9 | 273.3 | 358.2 | 351.8 | -178.3 | 102.8 |
| | | | | | | |
| Financial-Normal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Financial income | 10 | 8 | 14 | 9.7 | 9.4 | 10.6 |
| Financial expenses | -42.4 | -45.5 | -46.1 | -27.4 | -46.5 | -25.5 |
| Total normal financial profit | -32.4 | -37.5 | -32.1 | -17.7 | -37.1 | -14.9 |
| | | | | | | |
| Financial-Abnormal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| ForEx gain | 0 | 0 | 4.6 | 0 | 53.3 | 0 |
| ForEx loss | -6.2 | -9 | 0 | -15.1 | 0 | -31 |
| Other financial income | 0 | 0 | 0 | 0 | 0 | 22.2 |
| Abnormal financial profit | -6.2 | -9 | 4.6 | -15.1 | 53.3 | -8.8 |
| Loss/profit from discontinued operations | 0 | -9.7 | -60.7 | -6.7 | -12.9 | 0 |
| Total abnormal financial profit | -6.2 | -18.7 | -56.1 | -21.8 | 40.4 | -8.8 |

*Table 5: Normal and abnormal income statement items*

In 2017, corporate tax rate in Norway was 24%. The rate has declined from 28% during the period of analysis. We will assign tax rates with the associated statement. Gjesdal (2007) highlights the importance of distributing taxes for international companies facing several regulatory challenges, as the effective tax rate is likely to deviate from the corporate tax rate. One important issue when assigning tax rates is the "exemption method". This method states that corporations as owners of shares in external companies are exempt from paying tax on dividends and realized profits on those shares (KPMG, 2018). We do not find any evidence of such items in the financial income. Therefore, both normal and abnormal financial items are taxed with the associated corporate tax rate.

| Tax Financial-Normal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Total normal financial profit | -32.4 | -37.5 | -32.1 | -17.7 | -37.1 | -14.9 |
| Tax rate | 28 % | 28 % | 27 % | 27 % | 25 % | 24 % |
| Tax | 9.1 | 10.5 | 8.7 | 4.8 | 9.3 | 3.6 |
| Net normal financial profit | -23.3 | -27.0 | -23.4 | -12.9 | -27.8 | -11.3 |

| Tax Financial-Abnormal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Abnormal financial profit | -6.2 | -9 | 4.6 | -15.1 | 53.3 | -8.8 |
| Tax rate | 28 % | 28 % | 27 % | 27 % | 25 % | 24 % |
| Tax | 1.7 | 2.5 | -1.2 | 4.1 | -13.3 | 2.1 |
| Loss/profit from discontinued operations | 0 | -9.7 | -60.7 | -6.7 | -12.9 | 0 |
| Net abnormal financial profit | -4.5 | -16.2 | -57.3 | -17.7 | 27.1 | -6.7 |

*Table 6: Tax on financial items.*

The operating tax rate will be calculated through distribution of the remaining tax. That is, the tax on financial items deducted from the reported tax rate.

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Tax distributed to financial items | 10.8 | 13.0 | 7.4 | 8.9 | -4.1 | 5.7 |
| Reported taxes | -152.7 | -139.0 | -148.4 | -211.6 | -256.9 | -229.3 |
| Reimaining tax | -163.5 | -152.0 | -155.8 | -220.5 | -252.9 | -235.0 |

*Table 7: Tax attributable to operating items.*

When distributing the remaining tax, we assign all of it to the normal operating items to find net EBIT. OCI items are stated as after-tax numbers, which is why no tax will be assigned to these items. Table 8 shows that the operating tax rate has been stable over the period of analysis. The average tax rate of 25% is close to the theoretical average of the last years.

| Tax Operating-Normal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Total normal pre-tax operating profit | 661.9 | 601 | 627.5 | 890.7 | 987.7 | 915.5 |
| Operating tax rate | 24.7 % | 25.3 % | 24.8 % | 24.8 % | 25.6 % | 25.7 % |
| Net normal operating profit | 498.4 | 449.0 | 471.7 | 670.2 | 734.8 | 680.5 |

| Tax Operating-Abnormal | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Total abnormal operating profit | -142.9 | 273.3 | 358.2 | 351.8 | -178.3 | 102.8 |
| Net abnormal operating profit | -142.9 | 273.3 | 358.2 | 351.8 | -178.3 | 102.8 |

*Table 8: Tax on operating items.*

### 6.3.2 Balance

The reported balance sheet should be separated through current and non-current assets and liabilities. It is more appropriate to use a statement separated through operating and financial assets/liabilities when analyzing profitability.

We will start with a short reasoning of what we assess to be financial assets. Long term receivables are made up of deposits, capital lease, loans to employees and other long-term receivables. Capital lease relates to machines sold to customers on financial lease contracts. This is an operating item, while the remaining long-term receivables are financial. Other investments are financial in entirety. Cash and cash equivalents are difficult to separate into operational and financial assets. Some of the cash is likely to be used in relation to operations.

The notes provide no insight in relation to the issue. We will therefore treat it as a financial item. Lastly, an asset called "assets held for sale" appeared only in 2014. We classify this as a financial asset, due to the company's pure intention of selling the asset when it appeared on the sheet.

Operating assets are used in the ongoing operations of the business. There are several items fitting of this description in addition to the capital lease. IFRS requires that goodwill is measured as the difference between the cost of the acquisition over the acquirer's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities (Jerman & Manzin, 2008). Therefore, goodwill is related to acquisitions and purely an operating asset. Development costs and intangible assets are related to the operations of the business. Leasing equipment refers to vending machines and sorters leased to customers from the companies within Tomra Group. This is a part of the ongoing operations in the business. The notes provide information of property, plant and equipment, trade receivables, other short-term receivables and inventory which deems it reasonable to classify these items as operating assets. Investments in associates consist of joint ventures or closely related companies. These investments are mainly done to improve the company's own operation through know-how and synergy effects. Deferred tax assets are mostly related to the inventory, and therefore an operating asset.

In the financing part of the balance sheet, we will start with a classification of financial items. Short term interest bearing-, and long-term interest-bearing liabilities are not strictly connected to the company's operations. The same can be said of other long-term liabilities. An item called liabilities held for sale occurred in the annual report for 2014. We use the same reasoning as we did when assigning assets held for sale. All items mentioned above are financial liabilities.

Most of the remaining items are straightforward to assign. Trade payables, income tax payable and provisions are short term operating liabilities. We do not find any evidence of other current liabilities relating to any operations in the notes. Pension liabilities are related to the employees' salaries, and therefore an operating liability.

The restructured statements will be presented after we have adjusted for measurement errors.

### 6.3.3 Measurement errors

Some items may be hidden from the annual statement due to accounting conditions. These can contribute to bias in profitability measures. These errors include:

- Recognize historical cost rather than the fair value.

- "Creative" accounting.
- Allowing posts to be written in several manners. E.g. writing a balance item as cost.

Fardal (2007) writes of a greater focus on fair value in IFRS reporting. Tomra's statements inform that items are prepared and based on historical cost. One exception is derivative financial instruments which are recognized at fair value. These make up the items in the statement that are valued by a marketplace, and therefore can be recognized at fair value. We see no reasons or opportunities to do further adjustments relating to this concern.

Creative accounting and manipulation of numbers is not likely to be a problem. The annual report is audited by an external, independent auditor. We trust these to act with integrity and expose such activities. There will be no adjustments related to creative accounting.

The last source of error is of major concern. This type of error skews the profitability measures of the company by excluding some of the capital invested in the business. We will now examine the appearance of operating lease expenses and R&D expenses during the period of analysis.

Contrary to capital leases, operating leases are not shown on the balance sheet. "IFRS 16 leases was issued in January 2016 with effective date 1. January 2019" (Tomra Systems ASA, 2018, p. 53). The new legislation requires Tomra to recognize new assets and liabilities for their operating leases. Consequently, the company expect the balance sheet to increase by 10-15%, which has negative impact on some key figures. For now, this adjustment must be done by the analyst. Operating leases are assets leased on short term, compared to the full life of the leased asset. One can argue that future operating lease commitments are, in fact, liabilities. The notes in the financial statement provides the following the information on minimum future operating lease commitments.

| Minimum lease payments under operational lease | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Not longer than one year | 73.1 | 92.4 | 109.4 | 122.9 | 142.2 | 164.3 |
| Between one and five years | 180.4 | 193.7 | 253.3 | 326.3 | 373.3 | 411.9 |
| More than five years | 95.4 | 129.1 | 235.1 | 339.3 | 456.4 | 448.9 |

*Table 9:Reported operating lease expenses 2012-2017*

These future commitments should be discounted back to present values via the firm's cost of debt. We will present the calculation of cost of debt later in the paper, in relation to discount rates. The lease commitments are discounted through a temporary measure. Both calculations are done by calculating an interest coverage ratio (ICR) and assign a credit rating and related credit spread. The difference is that we have derived the ICR with the pre-adjusted numbers in

the temporary measure. We obtained a pre-tax cost of debt of 2.44%, which is used to discount future commitments. The present value (PV) of these are added to non-current assets and non-current liabilities in the balance sheet.

$$Adjusted\ debt = Debt + PV\ of\ lease\ commitments$$

As the notes do not present a year-to-year overview of lease commitments, we have to do some approximations. For the first period, we will spread the expenses equally on each year (1-5 years). Furthermore, we will use the average commitment from the first five years to decide the number of years the "5 years and beyond"-segment represents.

There will also be an adjustment to EBIT due to imputed interest expense on the debt value. These are included as operating expenses in the annual statement, while they actually should be treated as financial expenses. The adjusted increases in the EBIT:

$$Adjusted\ EBIT =$$

$$EBIT + Debt\ value\ of\ operating\ lease\ expense \times Interest\ rate\ on\ debt$$

While the EBIT increases, the net income will remain the same. The reason is simply that financial expenses are added by the same value. The adjusted EBIT carry an assumption that depreciation on the leased asset approximates the principal portion of the debt being repaid (Danodaran, 2012).

| Operating lease adjustments | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Operating profit/EBIT | 661.9 | 601.0 | 627.5 | 890.7 | 987.7 | 915.5 |
| Interest expense | -6.1 | -7.0 | -10.5 | -14.2 | -17.5 | -18.3 |
| Adjusted EBIT | 668.0 | 608.0 | 638.0 | 904.9 | 1005.2 | 933.8 |
| Tax | 1.5 | 1.8 | 2.6 | 3.5 | 4.5 | 4.7 |
| Adjusted net operating income | 503.0 | 454.2 | 479.6 | 680.9 | 747.8 | 694.1 |
| Total liabilities | 2802.1 | 2799.7 | 3265.3 | 3211.7 | 2744.8 | 3699.7 |
| Lease related debt | 248.5 | 288.1 | 429.7 | 580.4 | 715.3 | 749.4 |
| Adjusted debt | 3050.6 | 3087.8 | 3695.0 | 3792.1 | 3460.1 | 4449.1 |

*Table 10: Adjustments due to capitalization of operating lease expenses*

The lease adjustment has a low impact on EBIT. The major adjustment finds place in the balance sheet. PV of operating lease commitments is added in table 10, and causes a significant increase in debt. Complete calculations are provided appendix 2.

Research and development is at the center of both business areas. For Tomra, these activities are crucial to create and maintain competitive advantage. RL § 5-6 (Finansdepartementet, 1998) underlines that research activities can be expensed when they occur. At the same time, these assets are not allowed to be posted in the balance sheet. For an analyst, this can have severe

manifestations when valuing the firm. Our goal is to add amortization and the equity value of the "research asset" to the statement.

The dynamic business environment plays an important role in deciding when effects from new technologies will wear out. Though formally operating within industry, Tomra is partly a tech company. We will reflect this by assuming the amortizable life of R&D assets to be 5 years. R&D assets are meant to last for several periods, but innovative environments expedite obsolescence. Tomra's recognized expenditure on research and development varies in some reports. We will use numbers from the newest report containing the needed information.

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| R&D expense | 205.2 | 186.7 | 197.5 | 232.2 | 244.4 | 276.4 |

*Table 11: Reported R&D expense 2012-2017.*

To calculate the balance value of the research asset, we need to assign weights representing the remaining amortizable life on the asset for every year. The research expenditure in 2017 has not yet been amortized, and is added in full. Furthermore, 4/5 of 2016s expenditure, and 3/5 of 2015s expenditure is added. This continues until we have added all unamortized research expenditures.

$$\sum_{t=-(n-1)}^{t=0} R\&D_t \frac{(n+t)}{n}$$

Capitalization of the research assets leads to adjustments of the EBIT and the balance:

$$Adjusted\ book\ value\ of\ equity = Book\ value\ of\ equity + Value\ of\ research\ asset$$

Capitalization of R&D leads to a replacement of the R&D expenses with the amortization of the research asset in the EBIT. The effect on EBIT is therefore decided by the trend in research expenditure.

$$Adjusted\ EBIT = EBIT + R\&D\ expenses - Amortization\ of\ research\ asset$$

Adding R&D to the lease adjusted items, we obtain the following values:

| R&D adjustments | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Lease adjsuted operating profit | 668.0 | 608.0 | 638.0 | 904.9 | 1005.2 | 933.8 |
| R&D expense | 205.2 | 186.7 | 197.5 | 232.2 | 244.4 | 276.4 |
| Amortization on R&D | 164.8 | 174.4 | 177.7 | 188.4 | 200.3 | 213.2 |
| R&D adjusted EBIT | 708.4 | 620.3 | 657.8 | 948.7 | 1049.3 | 997.0 |
| R&D adjusted net operating income | 503.0 | 454.2 | 479.6 | 680.9 | 747.8 | 694.1 |
| Equity | 2356.9 | 2823.5 | 3359.4 | 4105.5 | 4370.0 | 4737.4 |
| Value of R&D asset | 544.3 | 556.6 | 576.4 | 620.2 | 664.4 | 727.6 |
| Adjusted Equity | 2901.2 | 3380.1 | 3935.8 | 4725.7 | 5034.4 | 5465.0 |

*Table 12: Adjustments due to capitalization of R&D expenses.*

The R&D expenditure outweighs the amortization in every year. This leads to an upwards adjustment of the EBIT. If Tomra's growth in R&D expenditures continues at the current rate in the future, the effect is likely to stay positive. The most significant adjustment finds place in the balance sheet. Intangible assets increase by the value of the research asset. Consequently, equity is augmented by the value of the "research asset". Operating lease commitments and R&D assets are somewhat offloading each other's effect on the financing part of the balance. It is the tax benefit from R&D expensing that allows us to add the difference between R&D expense and amortization directly to the after-tax EBIT Damodaran (2012). A complete overview of the calculations related to R&D can be found in appendix 3.

We will not capitalize other operating expenses, as we have not identified any additional expenses that will benefit the company over several periods.

## 6.4 Restructured annual statement

In this part, we present the restructured income statement and balance sheet. These will be used throughout the valuation.

| Restructured Income statement | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Normal operating profit | 708.4 | 620.3 | 657.8 | 948.7 | 1049.3 | 997.0 |
| Tax | -165.0 | -153.8 | -158.4 | -224.0 | -257.3 | -239.7 |
| Net operating profit (own business) | 543.4 | 466.5 | 499.4 | 724.7 | 792.0 | 757.3 |
| Profit from associates | 7.1 | 6.6 | 3.4 | 8.1 | 4.2 | -4.7 |
| Net operating profit | 550.5 | 473.1 | 502.8 | 732.8 | 796.2 | 752.6 |
| Net normal financial income | 7.2 | 5.8 | 10.2 | 7.1 | 7.1 | 8.1 |
| Net normal financial expenses | -30.5 | -32.8 | -33.7 | -20.0 | -34.9 | -19.4 |
| Net income non-controlling interests | -31.9 | -42.5 | -51.7 | -68.3 | -43.1 | -39.2 |
| Net income | 495.3 | 403.6 | 427.6 | 651.6 | 725.2 | 702.1 |
| Net abnormal operating profit | -142.9 | 273.3 | 358.2 | 351.8 | -178.3 | 102.8 |
| Net abnormal financial profit | -4.5 | -16.2 | -57.3 | -17.7 | 27.1 | -6.7 |
| Total net income | 347.9 | 660.7 | 728.5 | 985.7 | 574.0 | 798.2 |

*Table 13: Consolidated restructured income statement.*

| Restructured balance sheet | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Assets | | | | | | |
| Total non-current financial assets | 68.0 | 76.0 | 91.6 | 100.7 | 105.2 | 118.7 |
| Total current financial assets | 177.2 | 164.1 | 562.1 | 312.9 | 399.2 | 593.5 |
| Total financial assets | 245.2 | 240.1 | 653.7 | 413.6 | 504.4 | 712.2 |
| Total non-current operating assets | 3840.2 | 4130.0 | 4527.4 | 5144.0 | 5167.6 | 6117.1 |
| Total current operating assets | 1866.5 | 2097.8 | 2449.8 | 2960.2 | 2822.4 | 3084.8 |
| Total operating assets | 5706.7 | 6227.8 | 6977.2 | 8104.2 | 7990.0 | 9201.9 |
| Total assets | 5951.9 | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |
| | | | | | | |
| Restructured balance sheet | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| Liabilities and equity | | | | | | |
| Total current financial liabilities | 5.6 | 552.1 | 114.8 | 0.0 | 0.0 | 0.0 |
| Total non-current financial liabilities | 1546.1 | 1004.4 | 1593.0 | 1268.7 | 833.0 | 1429.1 |
| Total financial liabilities | 1551.7 | 1556.5 | 1707.8 | 1268.7 | 833.0 | 1429.1 |
| Non-controlling interest | 73.6 | 82.6 | 115.4 | 160.4 | 177.7 | 143.3 |
| Total current operating liabilities | 1096.3 | 1076.2 | 1334.0 | 1731.0 | 1731.3 | 2045.2 |
| Total non-current operating liabilities | 402.6 | 455.1 | 653.2 | 792.4 | 895.8 | 974.8 |
| Total operating liabilities | 1498.9 | 1531.3 | 1987.2 | 2523.4 | 2627.1 | 3020.0 |
| Total liabilities | 3124.2 | 3170.4 | 3810.4 | 3952.5 | 3637.8 | 4592.4 |
| Total equity | 2827.6 | 3297.5 | 3820.4 | 4565.3 | 4856.7 | 5321.7 |
| Total liabilities and equity | 5951.9 | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |

*Table 14: Consolidated restructured balance sheet.*

# 7 Credit analysis

This chapter aims to provide insight to the financials of the company. This will be done through a credit analysis conducted on several metrics.

## 7.1 Altman z-score

Altman (1968) developed a framework for measuring the financial health of a company. The Z-score obtained from the analysis can be used to predict the probability a firm going into bankruptcy within two years. It can also be used to find a suited credit rating. The following formula is used to calculate a Z-score (Altman, 2000).

$$Z = 1.2X_1 + 1.2X_2 + 3.3X_3 + 0.6X_4 + 1X_5$$

Where:

$$X_1 = \frac{Working\ capital}{Total\ assets}$$

$$X_2 = \frac{Retained\ earnings}{Total\ assets}$$

$$X_3 = \frac{EBIT}{Total\ assets}$$

$$X_4 = \frac{Market\ value\ of\ equity}{Book\ value\ of\ total\ liabilities}$$

$$X_5 = \frac{Sales}{Total\ assets}$$

$$Z = Overall\ index$$

The general interpretation of the Z-score is as follows:

$$Z > 2.99, the\ company\ is\ considered\ "safe"$$

$$1.80 < Z < 2.99, the\ company\ is\ in\ the\ "gray\ area"$$

$$Z < 1.80, the\ company\ is\ in\ the\ "distress\ area"$$

These interpretations are approximate, and we need to compare with an industry average in order to draw reasonable conclusions. $X_4$ includes a market based item. Thus, the comparable firms should be public. However, Altman (2000) suggests an adjustment to the original model

when analyzing private firms. The $X_4$ ratio should include the book value of equity, rather than the market value. The revised Z-score model for private firms is then:

$$Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$$

The interpretation is slightly different for this model. A Z' score below 1.23 represents a company in the "distress zone", while above 2.90 is considered "safe". Based on Tomra's current segmentation of operations, we believe the comparable firms should operate solely in the collection segment or sorting segment. We have chosen the public firm Envipco Holding from the first, and the private firm Buhler Sortex from the latter segment. As seen in the introduction chapter, Envipco is Tomra's second largest competitor in the collection segment. While Diebold Nixdorf is larger, their operations within the collection segment accounts for only a small part of their total revenues. In order to obtain a consistent analysis, we have adjusted the relevant metrics for abnormal items and measurement errors, using the same methods as described in the last chapter. These adjustments are shown in appendix 4 and 5. We will show the ratios directly, as it allows us to bypass the stress and pitfalls of converting currencies. The Z and Z' model should be interpreted with caution. The different scaling and inputs makes it difficult to compare private and public firms. However, Tomra has few public comparable competitors in the sorting segment. 4 of 5 inputs can be compared directly. We will not emphasize the $X_4$ input extensively, other than in the overall Z score. We have included Tomra's numbers in the "industry average" ratios.

### 7.1.1 $X_1$

Working capital is the difference between current assets and current liabilities. The $X_1$ ratio is a liquidity measure, which shows the percentage of assets needed to run day to day operations. A high ratio implies that the firm is able to meet its short-term liabilities.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Working capital | 633.6 | 1563.1 | 1542.1 | 1490.3 | 1633.1 |
| Total assets | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |
| Tomra X1 | 0.10 | 0.20 | 0.18 | 0.18 | 0.16 |
| Industry X1 | 0.17 | 0.24 | 0.21 | 0.20 | 0.24 |

*Table 15: Altman Z-score X1 performance*

Tomra is outscored by the industry average in all of the five years. Recent development suggest that the company's relative liquidity has declined since the top in 2014. The sudden increase in working capital from 2013 to 2014 is caused by a significant increase in receivables and cash. We are unable to find any information on this matter.

### 7.1.2 $X_2$

Retained earnings are the accumulated earnings the business has not paid out in dividends. Thus, this ratio describes the financing of the firm. Lower relative retained earnings mean the business has to borrow in order to finance asset funding. A high proportion of retained earnings increases the company's ability to repay loans. Altman (2000) argues that the age of the company is built into the measure, as younger companies have had less time to build up cumulative profits. This reflects the reality of younger firms more often failing.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Retained earnings | 2231.4 | 2754.3 | 3499.4 | 3790.9 | 4255.9 |
| Total assets | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |
| Tomra X2 | 0.34 | 0.36 | 0.41 | 0.45 | 0.43 |
| Industry X2 | -0.37 | -0.28 | -0.13 | -0.02 | -0.08 |

*Table 16: Altman Z-score X2 performance.*

Tomra's ratios looks to be healthy when comparing to the average. The industry average is heavily skewed by Envipco's accumulated deficits. Tomra's history shows a positive trend in the ratio, implying a relative increase in funds held for future reinvestments.

### 7.1.3 $X_3$

This ratio shows the company's ability to generate operating profits on its assets.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| EBIT | 620.3 | 657.8 | 948.7 | 1049.3 | 997.0 |
| Total assets | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |
| Tomra X3 | 0.10 | 0.09 | 0.11 | 0.12 | 0.10 |
| Industry X3 | 0.05 | 0.03 | 0.07 | 0.07 | 0.06 |

*Table 17: Altman Z-score X3 performance.*

Tomra's numbers are again well above the industry average. Envipco has been struggling with negative profits in the first two years of the period, skewing the averages for 2013 and 2014. Tomras relative profits has been stable over the period, generating about 10% of the total asset value.

### 7.1.4 $X_4$

$X_4$ includes a market based component. Altman (2000) explains that the measure shows how much the firm's assets (Market value of Equity+Debt) can decline in value before the liabilities exceed the assets and the firm becomes insolvent. We have obtained market value of equity

from the closing price on the release date of the corresponding annual statement. We will compare Tomra only with Envipco in this part, as Buhler is a private company.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| MV equity | 9177.2 | 10028.4 | 12618.7 | 13876.9 | 24275.3 |
| BV liabilities | 3170.4 | 3810.4 | 3952.5 | 3637.8 | 4592.4 |
| Tomra X4 | 2.89 | 2.63 | 3.19 | 3.81 | 5.29 |
| Envipco X4 | 0.57 | 0.58 | 0.56 | 2.13 | 2.48 |

*Table 18: Altman Z-score X4 performance.*

Tomra shows strength in this measure. Their dominance in the collection segment most likely affects expectations, driving up the stock price. Hence, the company's superiority over Envipco on this measure. The business structures of the companies might be a second reason for the big gap. As we underlined in our strategic analysis, the sorting segment is experiencing a period of extraordinary growth at the moment. This applies only to Tomra.

### 7.1.5 $X_5$

The last measure in the Z score model is the asset turnover ratio. Altman (2000) refers to it as a measure of the managements capacity in dealing with competitive conditions. It is, in other words, a measure of efficiency.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Sales | 4602.1 | 4749 | 6142.9 | 6609.9 | 7432.1 |
| Total assets | 6467.9 | 7630.9 | 8517.8 | 8494.4 | 9914.1 |
| Tomra X5 | 0.71 | 0.62 | 0.72 | 0.78 | 0.75 |
| Industry X5 | 0.82 | 0.74 | 0.80 | 0.78 | 0.78 |

*Table 19: Altman Z-score X5 performance.*

Tomra is slightly lagging on $X_5$. The trend is positive, nearly closing the gap between Tomra and the industry average in the last years. It can be argued that these firms do not provide a completely accurate industry average. Tomra's current dominance in the collection segment and the heavy presence of private firms of reasonable size provides a challenging fundament. Due to this and time limitations, the average is made up of only one company from each business area. Tomra unarguably looks to be in a healthy state when comparing these metrics to the industry average. We will use the Z-score to derive an overall assessment on Tomra.

| | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Tomra Z | 3.37 | 3.24 | 3.80 | 4.31 | 5.05 |

*Table 20: Tomra's Altman Z-score 2012-2017.*

As we mentioned, a score above 2.9, is considered as “safe”. Tomra’s Z score verifies our initial view. History shows a positive trend in the score, although the company already had a “safe” rating in 2013. We will consider these results further when estimating a synthetic rating for Tomra in chapter 9.

# 8 Reinvestment needs

We must assess the company's reinvestment needs to compute future cash flows. Reinvestment needs are made up by net capital expenditures and non-cash working capital.

## 8.1 Net capital expenditures

Capital expenditures (capex) are money spent internally by the company on fixed assets. A company's capex is usually spent on new, or improvements to current property, plant and equipment. The year-to year capex can be found in the cash flow statement. It is important to include external expenditures on acquisitions as capex, to capture the full extent of these expenditures. Investments in fixed assets are often volatile. Companies usually also do not have a steady annual rate of acquisitions. Adding acquisitions therefore increases the volatility of the capex. Expansion through acquisitions have historically been an important strategy for Tomra, as we addressed in our strategic analysis. We expect the company to maintain high expenditures on acquisitions in the future. Capitalized expenses should also be considered as capex. These are long term investments which are expected to last for several periods.

The net capex is given by capex less depreciation. Depreciation represents a cash inflow which offset the capex in the period they occur. Thus, only the excess capex drains the cash flows. The net capex cash flow is likely to remain volatile, even though depreciation usually is more stable. Damodaran (2012) suggest a normalization of capex and acquisitions over a number of years to smooth out extreme expenditures. Trends and patterns over time can then be captured. While not a bulletproof method, it is certainly more reasonable that using numbers from a single year for companies with volatile capex. Depreciations should be left untouched unless they are very volatile. The table shows Tomra's reported capex from the cash flow statement, and depreciation from the income statement.

| Capex | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Proceeds from sales of non-current assets | -12.4 | -39.8 | -47.7 | -60.1 | -43.3 | -50.5 |
| Proceeds from sale of subsidiary | -57.9 | 0.0 | 0.0 | -101.4 | -2.7 | 0.0 |
| Acquisition of subsidiary / Capital infusion | 886.7 | -3.7 | 19.6 | 42.1 | 0.0 | 423.6 |
| Investment in non-current assets | 221.3 | 274.2 | 313.8 | 401.9 | 363.6 | 556.4 |
| Proceeds from sale of shares | 0.0 | 0.0 | 0.0 | -2.3 | 0.0 | 0.0 |
| Capex | 1037.7 | 230.7 | 285.7 | 280.2 | 317.6 | 929.5 |
| Ordinary depreciation | -229.0 | -258.3 | -260.1 | -303.3 | -342.9 | -374.2 |
| Net capex | 808.7 | -27.6 | 25.6 | -23.1 | -25.3 | 555.3 |

*Table 21: Reported capital expenditure.*

The adjustments we did in the last chapter needs to be added to the net capex and depreciation, to obtain consistency in the cash flows.

$$Added\ depreciation_t = Amortization\ of\ research\ asset_t$$

$$Added\ net\ capex_t = (PVOL_t - PVOL_{t-1}) + R\&D\ Expense_t$$

Where:

$$PVOL = Present\ value\ of\ operating\ lease\ commitments$$

Increases in lease commitments lead to a positive adjustment of net capex, and thereby higher reinvestment needs. Capitalization of R&D leads to an increase in capex equal to the R&D expenditure. At the same time depreciation increases with the amortization on R&D. While the net capex may be affected by this, the effect is equalized by the adjustment in EBIT. Thus, the net adjustment in cash flows is zero. We obtain the following net capex when adjusting for errors of measurement:

| Adjusted net capex | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| ΔPVOL | 39.6 | 141.7 | 150.6 | 134.9 | 34.2 |
| R&D expense | 186.7 | 197.5 | 232.2 | 244.4 | 276.4 |
| Adjusted capex | 457.0 | 624.9 | 663.0 | 696.9 | 1240.1 |
| Amortization on R&D | -174.4 | -177.7 | -188.4 | -200.3 | -213.2 |
| Adjusted depreciation | -432.7 | -437.8 | -491.7 | -543.2 | -587.4 |
| Adjusted net capex | 24.2 | 187.1 | 171.4 | 153.7 | 652.7 |

*Table 22: Capitalized expenses adjustments to capex.*

The net capex in our free cash flow model will include depreciation from last year (2017) and normalized capex (including acquisitions) over the last 5 years. Depreciation has been increasing at a steady rate. We therefore believe it is better to use the latest available observation for forecasting of this measure.

## 8.2 Non-cash working capital

As we explained in chapter 7, working capital is defined as:

$$Working\ capital = Current\ assets - Current\ liabilities$$

This liquidity measure describes how much money the company has available for day to day operations after covering liabilities. In the non-cash working capital, the cash and interest-bearing debt is backed out. These are items that can earn a fair return, and should not be included in the measure (Damodaran, 2012). The arguments for using normalized numbers for this measure are strong. There is no guarantee that numbers from one year are representative for the company in the long run.

| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Average (last 5 years) |
|---|---|---|---|---|---|---|---|
| Non-cash WC | 759.0 | -82.6 | 1036.4 | 1229.2 | 1091.1 | 1039.6 | 862.7 |
| Change in non-cash WC | | -841.6 | 1119.0 | 192.8 | -138.1 | -51.5 | 56.1 |

*Table 23: Change in non-cash working capital.*

The changes in non-cash working capital are shown in table 23. The negative non-cash working capital in 2013 leads to a big change. The quick regain in 2014 leads to another big change, cancelling the first abnormal observation. The average shows a small positive value which we will use when forecasting future cash flows.

# 9 Discount rates

In this part, we will estimate the discount rates. These will be applied to the estimated future cash flows from the company.

## 9.1 Risk-free rate

According to PwC's annual study on risk premium in the Norwegian market, analysts prefer to use the 10-year treasury bonds as the risk-free rate (PwC, 2017). Advantages of using 10-year bonds includes low volatility due to the time to maturity. Additionally, 10-year bonds have a higher liquidity than for example 30-year government bonds. The second most common method is through normalizing long-term risk-free rates.

The risk-free rate we intend to use is calculated from the average daily 10-year treasury bond yield from the last 5 years. Normalization prevents extreme observations from skewing the output. Some data points are missing in the dataset we downloaded. We solved the issue by extrapolating with the mean of the former and next values. This method shows a risk-free rate of 1.94%. This is not far from the current rate of 1.93% (03.04.18). The valuation is therefore not likely to be affected largely by our choice of method.

## 9.2 Equity risk premium

The Oslo Stock Exchange Benchmark Index (OSEBX) shows that the market has averaged an annual return of 11.1% over the last 5 years. The number is obtained through arithmetic average of daily log returns, to adjust for compounding. Deducting the risk-free rate gives an ERP of 9.16%. This number seems high. The limited period may inflate the number to unreasonable levels. While this is the most common practice for estimation of ERP, there are several drawbacks of using historical data. The period of analysis can be skewed by macroeconomic events, e.g. the financial crisis of 2007-2008. Furthermore, there are no guarantees of the market behaving the same way as in the past. The historical estimate method is preferred due to its availability and prevalence in the world of finance. We will therefore validate with other sources to obtain an alternative estimate of the ERP. Norges Bank (2016) found that the mean realized ERP in Norway was 5.9% between 1970 and 2014. The long period is more robust to anomalies, and thus more trustworthy. PwC's annual study on the risk premium suggest that the ERP currently is at 5% in the Norwegian market. We will use the average from these two studies, as they provide deeper insight than we can obtain during our limited time of research. The average ERP is 5.95%.

## 9.3 Beta

Koller, Goedhart, & Wessels (2010) argues that at least 60 observations are preferable in a beta calculation. We will first employ the formula shown in the "approaches to valuation"-chapter.

$$\beta = \frac{Covariance\ of\ asset\ i\ with\ market\ portfolio}{Variance\ of\ the\ market\ portfolio} = \frac{\sigma_{im}}{\sigma_m^2}$$

Daily returns show a beta of 0.42, while weekly returns show a beta of 0.56 with this method. If the OSEBX returns 1% in a single day, we can expect Tomra to return about 0.43%. Any of the methods implies that the company historically has been far less volatile than the market. This is somewhat atypical of a high growth firm. On the contrary, negative returns are expected to be limited.

We have also conducted a simple linear regression of both daily and weekly returns. Tomra's returns are set as the dependent variable and OSEBX return as the independent variable. This method provides in-depth information we will use to assess the different betas.

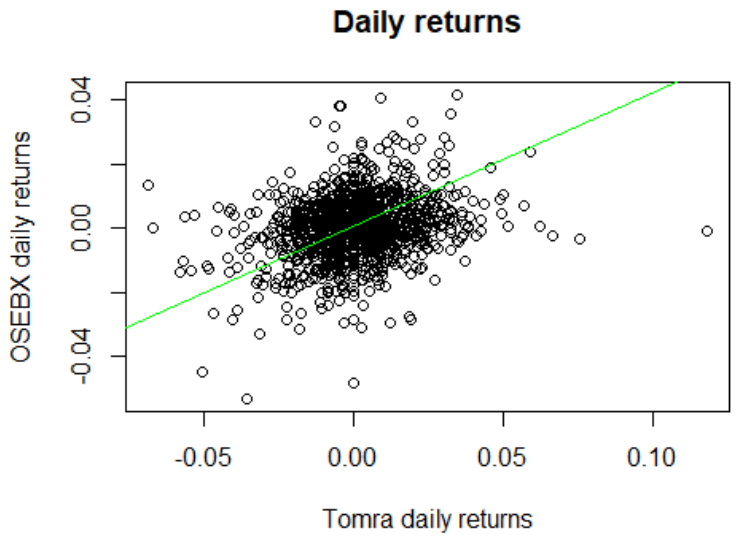


*Figure 12: Plot daily reurns*

| Coefficients | Estimate | Std. Error | t value | Pr(>\|t\|) |
|---|---|---|---|---|
| Intercept | 0.00 | 0.00 | 1.27 | 0.20 |
| OSEBX daily returns | 0.42 | 0.05 | 9.18 | <2e-16 |
| R^2 | 0.06 | | | |

*Table 24: Regression beta, daily returns.*

The coefficient shows that an 1% increase in the daily OSEBX returns leads to a 0.42% increase in Tomra's daily returns, on average. This is in line with our initial calculation. The p-value below 5% states that there is a significant relationship between the variables. The $R^2$ explains the relationship between the variation in both variables. The $R^2$ of 0.063, indicates that 6.3% of the variation in Tomra's weekly returns can be explained by the variation in OSEBX weekly returns.

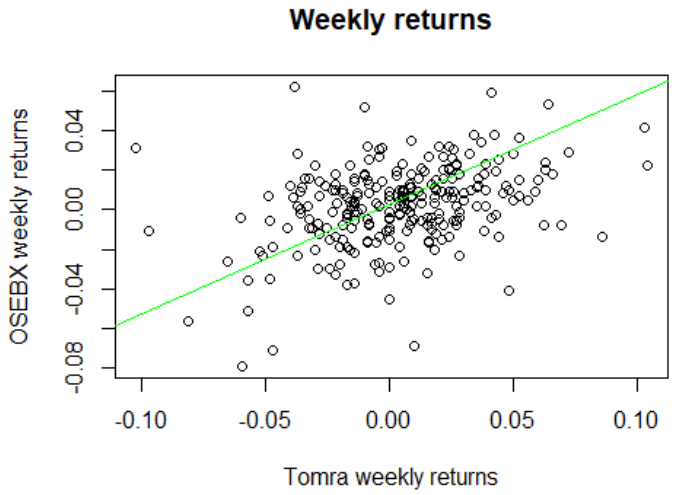


*Figure 13: Plot weekly returns*

| Coefficients | Estimate | Std. Error | t value | Pr(>\|t\|) |
|---|---|---|---|---|
| Intercept | 0.00 | 0.00 | 1.35 | 0.18 |
| OSEBX daily returns | 0.56 | 0.09 | 6.16 | 2.84e-09 |
| R^2 | 0.13 | | | |

*Table 25: Regression beta, weekly returns.*

The coefficient from the regression of weekly returns confirms our initial calculation yet again. The p-value on OSEBX weekly returns is below 5%. These returns can then be said to have a significant relationship with Tomra's weekly returns. The $R^2$ equals 0.128. In other words, 12.8% of the variation in Tomra's weekly returns can be explained by the variation in OSEBX weekly returns.

We have verified our measure with Bloomberg's estimates. They operate with a raw beta of 0.56 on daily data for the last 5 years. This is consistent with our weekly estimate. The weekly estimate also has the highest R-squared of the two. We will therefore use the beta based on weekly returns from the last 5 years. In our strategic analysis, we argued that the company can maintain a high growth rate for 10 years. It is reasonable to assume that Tomra's beta will move

towards the market's as the company grows and matures. We have chosen to adjust the raw beta to reflect this:

$$\frac{2}{3} \times \beta_a + \frac{1}{3} \times 1$$

The formula supports our assumptions, and adjusts for these dynamics. The output from the formula shows a beta of 0.71. We will use this number in the discount rates related to cash flows after the initial 10-year period of high growth. The adjusted beta reflects the company's maturation. It is assumed that companies will become more similar to the overall economy in the long run. Alternatively, we could have used a beta closer to 1, but we believe it is reasonable that the firm and industry specific characteristics could delay or stop the evolution of this metric.

## 9.4 CAPM Summary

When putting all high-growth input values into the CAPM, we get:

$$K_{e,h} = 1.94 + 0.56 \times 8.9\% \rightarrow K_{e,h} = 7.3\%$$

The number will be used to discount equity during the high growth period.

We obtain a higher discount rate when using the Bloomberg adjusted beta.

$$K_{e,s} = 1.94 + 0.71 \times 8.9\% \rightarrow K_{e,s} = 8.26\%$$

## 9.5 Cost of debt

Both debt and equity needs to be discounted in free cash flow to firm models. When calculating cost of debt, credit ratings can be used to determine an appropriate default spread. Tomra's debt is not traded on any market and not rated by the credit institutions. Damodaran (2012) suggests a method for estimating a synthetic credit rating. This is done by analyzing the company's interest coverage ratio (ICR). The ICR is given by:

$$ICR = \frac{EBIT}{Interest\ expenses}$$

The measure reveals a company's capacity to make payments on interest expense.

| Cost of debt | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| Operating profit/EBIT | 620.3 | 657.8 | 948.7 | 1 049.3 | 997.0 |
| Interest expense | 42.7 | 47.1 | 33.7 | 33.4 | 37.4 |
| ICR | 14.5 | 14.0 | 28.2 | 31.5 | 26.7 |
| Credit rating | AAA | AAA | AAA | AAA | AAA |

*Table 26: Interest coverage ratio.*

According to Damodaran (2012), an ICR above 12.5 is equal to that of a AAA-rated high market cap company. We would also like to refer to the Z-score calculations we did in chapter 7. Tomra showed sound financials throughout the test, both relative to competitors and the overall market. We will therefore keep the synthetic credit rating from the ICR-method. The implied default risk for AAA-companies are 0.54% (Damodaran, 2018). Adding this to the risk-free rate of 1.94%, we get a cost of debt measure of 2.48%. We then calculate the after-tax value of cost of debt to account for the tax deductibility of interest rates. The marginal tax rate of 23% from 2018 is preferred due to the forecasting purpose of the valuation models.

$$K_d(1-t) = (1.94\% + 0.5\%) \times (1 - 23\%) \rightarrow K_d(1-t) = 1.9\%$$

## 9.6 Weighted average cost of capital

The next step is to calculate the discount rate for the capital.

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

Where:

$$K_e = Cost\ of\ equity$$

$$E = Value\ of\ equity$$

$$K_d = Cost\ of\ debt$$

$$t = tax\ rate$$

$$D = Value\ of\ debt$$

The cost of equity and cost of debt were calculated in the subsections above. The remaining input relates to the capital structure of the company, as the discount rate is a weighted average of the cost of equity and cost of debt. Tomra inform of a 55% equity financing in the latest annual report (2017). However, in the methods chapter we argued that the market value of capital should be used. The proportion of debt and equity is determined relative to the enterprise value (EV). Tomra's debt is not traded, which means we must use the book value of debt. The EV is given by:

$$EV = Market\ capitalization + total\ debt + minority\ interest - cash\ and\ short\ term\ investments$$

| | Current |
|---|---|
| Market cap | 24275.3 |
| EV | 26386.6 |
| E/D+E | 92.0 % |

*Table 27: Equity to enterprise value ratio*

The market based financing ratios are very different from the book value ratios. A greater share of debt leads to an overall lower WACC. This is due to the significantly lower cost of debt. We do not have any information of a future target financing ratio. Our best estimate is to use the current ratio and assume it to be maintained in the future.

$$WACC_h = 5.2\% \times 92\% + 1.9\% \times 8\% = 4.9\%$$

$$WACC_s = 5.8\%\% \times 92\% + 1.9\% \times 8\% = 5.5\%$$

Again, the differences between the high-growth and the stable WACC is caused by the adjusted beta in cost of equity for the stable growth period.

# 10 Growth

Growth in earnings is of utmost importance when forecasting cash flows. The value of a company can be totally different when making new assumptions in relation to the growth rate. This chapter lays the foundation for our cash flow forecast by finding appropriate growth rates to each element in the FCFF formula.

## 10.1 Pattern and horizon

Both two-, and three-stage models are commonly used. There are also different assumptions to how the growth rate will be during the high-growth period. Our strategic analysis supports a high growth period of 10 years. We will therefore estimate the intrinsic value through a two-stage model where a high growth rate is maintained for 10 years, and abruptly falls to a terminal growth rate. While the theory may not be reasonable, the model not only captures the growth flow to cash flow. The terminal cash flow is a product of the former growth rates. As we underlined in the strategic analysis, new growth opportunities seem to occur frequently. It is very unlikely that the growth rate will be at the same level every year. However, Tomra has potential to recreate the average growth from the last 5 years over two more 5-year periods. Figure 13 shows the pattern of growth we intend to use in our model.

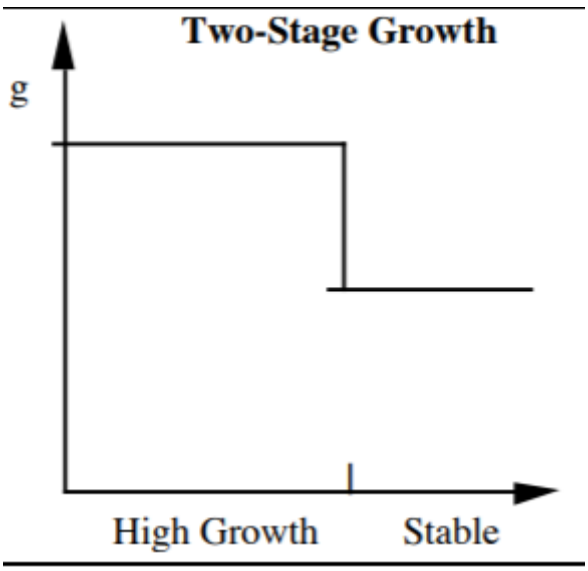


*Figure 14: Two-stage growth. (Damodaran 2016)*

The terminal cash flow is usually by far the most dominant in a valuation. The current growth rate in EBIT is not at an extreme, which makes the two-stage scenario possible. Our strategic analysis also identified few threats in the business environment at present time. We believe that this will change in the future, contributing to a lower growth rate in stable stage. While

maintaining a high growth rate, an assumption is that the company will reinvest at a stable rate. The rate expected to change in the stable stage. We will explain why, later in the chapter.

## 10.2 Historical growth

There are several ways to estimate the growth rate. Annual statements provide sufficient information to calculate historical growth. The drawback of historical growth is that historical data sometimes are misleading when predicting the future. Especially companies in high growth phases can leave misleading measures, as future growth is not included in the annual statement. Another problem arises when the company invests heavily in R&D. We have already bypassed the last problem by adjusting the income statement. A third problem relates to how the mean historical growth rate is calculated.

$$Arithmetic\ mean = \frac{\sum_{i=1}^{n} X_i}{n}$$

$$Geometric\ mean = \sqrt[n]{\prod_{i=1}^{n} X_i}$$

Damodaran (2012) argues that the geometric mean is a much more accurate measure of true growth in past earnings, as it takes into account the compounding that occurs from period to period. We will now present historical growth rates in several measures which are relevant for the valuation.

| Historical growth | EBIT | Growth rate | Net income | Growth rate | DPS | Growth rate |
|---|---|---|---|---|---|---|
| 2012 | 708.4 | | 495.3 | | 1.3 | |
| 2013 | 620.3 | -12.4 % | 403.6 | -18.5 % | 1.4 | 8.0 % |
| 2014 | 657.8 | 6.0 % | 427.6 | 6.0 % | 1.5 | 7.4 % |
| 2015 | 948.7 | 44.2 % | 651.6 | 52.4 % | 1.8 | 20.7 % |
| 2016 | 1049.3 | 10.6 % | 725.2 | 11.3 % | 2.1 | 20.0 % |
| 2017 | 997.0 | -5.0 % | 702.1 | -3.2 % | 2.4 | 11.9 % |
| Artihmetic mean | | 8.7 % | | 9.6 % | | 13.6 % |
| Geometric mean | | 7.1 % | | 7.2 % | | 13.5 % |

*Table 28: Historical growth*

Table 28 shows high growth rates in all measures. The geometric average will always be lower or equal to the arithmetic average. The average growth rate in EBIT and net income has been about the same over the period of analysis. The growth rate in dividends per share has been

significantly higher. When looking at year-to-year growth in DPS, we see an increase in the rate even in years with low growth in net income. The reason might be to that the company wants to attract a certain type of investors, or/and stay attractive for those who already have invested in the company.

A third method of growth estimation can be done through the fundamentals of the firm. The advantage of this method is that the growth rate is derived from the company's abilities to generate future growth.

## 10.3 Fundamental growth in EBIT

### 10.3.1 High growth-stage

We will now calculate the fundamental growth in EBIT, as it is a relevant measure for the free cash flows to firm. This growth rate is determined by the reinvestment rate and return on capital (ROC).

$$Reinvestment\ rate \times ROC = Fundamental\ growth\ in\ EBIT$$

The reinvestment rate is the amount of after-tax EBIT invested in new working capital and net capex. It is an estimate of how much the company is reinvesting to generate future growth.

$$Reinvestment\ rate = \frac{Net\ capex + \Delta noncash\ working\ capital}{EBIT(1-t)}$$

| Reinvestment rate | 2013 | 2014 | 2015 | 2016 | 2017 | Aggregate |
|---|---|---|---|---|---|---|
| EBIT (1-t) | 473.1 | 502.8 | 732.8 | 796.2 | 752.9 | 3257.8 |
| Net capex | 24.2 | 187.1 | 171.4 | 153.7 | 652.7 | 1189.1 |
| Change in non-cash WC | -841.6 | 1119.0 | 192.8 | -138.1 | -51.5 | 280.6 |
| Reinvestment rate | -172.8 % | 259.8 % | 49.7 % | 2.0 % | 79.8 % | 45.1 % |

*Table 29: Reinvestment rate.*

We assessed the net capex and change in non-cash WC in chapter 8. Table 29 shows that the reinvestment rate has been very volatile. The abnormal changes in working capital in 2013 and 2014 has large influence on the rate during these years. It is reasonable to do a normalization of the reinvestment rate over the period of analysis. One alternative would be to omit the abnormal values from the normalization. They do, however, cancel each other out to a certain degree. The aggregate reinvestment rate is 45.1% over the last 5 years. The growth in reinvestment rate are assumed to follow earnings growth in the high growth period. In other words, the company will reinvest more capital when experiencing growth. We will therefore

use the average from the last 5 years as a measure for future reinvestment rate. In the stable growth period reinvestments are expected to decline. We will address this in the next subchapter.

The ROC is a profitability measure. This is calculated by dividing the after-tax EBIT in the current year by start of the year balance values of equity and debt less cash and marketable securities. The output shows the company's ability to create value on invested capital.

$$ROC = \frac{EBIT(1-t)_{end}}{Invested\ capital_{start}}$$

$$Where:$$

$$Invested\ capital_{start} = BV\ of\ equity_{start} + BV\ of\ debt_{start} - cash\ holdings_{start}$$

| | 2013 | 2014 | 2015 | 2016 | 2017 | Aggregate |
|---|---|---|---|---|---|---|
| EBIT (1-t) | 473.1 | 502.8 | 732.8 | 796.2 | 752.9 | 3257.8 |
| Invested capital | 5242.4 | 5848.2 | 6335.8 | 6312.4 | 7098.5 | 27564.4 |
| ROC | 12.4 % | 9.6 % | 12.5 % | 12.6 % | 11.9 % | 11.8 % |

*Table 30: ROC*

The start of year balance value is represented by the ending value in the former year. Table 30 shows that Tomra currently yields a stable return on capital. The company is earning excess return on capital, as ROC greater than the WACC we calculated in the last chapter. In other words, the growth adds value to the company. We can now use the inputs to derive a fundamental growth rate.

| Expected growth EBIT | 2013 | 2014 | 2015 | 2016 | 2017 | Aggregate |
|---|---|---|---|---|---|---|
| Reinvestment rate | -172.8 % | 259.8 % | 49.7 % | 2.0 % | 79.9 % | 45.1 % |
| ROC | 12.4 % | 9.6 % | 12.5 % | 12.6 % | 11.9 % | 11.8 % |
| Expected growth in EBIT | -21.37 % | 25 % | 6.23 % | 0.25 % | 9.5 % | 5.3 % |

*Table 31: Fundamental growth in EBIT*

Table 32 shows that the average fundamental growth rate has been 5.3% during the last 5 years. We will use this in the first 10 years of our forecast.

When choosing a tax rate, Damodaran (n. d.) claims that the choice really is between the effective and the marginal tax rate. By using the marginal tax rate, we tend to understate the after-tax EBIT in the earlier years, but the after-tax tax EBIT is more accurate in later. While an argument can be made for using a weighted average marginal tax rate, it is safest to use the

marginal tax rate of the country. The corporate tax rate is 23% in 2018 in Norway (Regjeringen, 2017). We will use this rate in our forecast.

### 10.3.2 Terminal stage

The terminal growth rate is the rate which the company is expected to grow at in perpetuity. All intrinsic valuation models are sensitive to this input. The upper limit for the terminal growth rate is the overall growth rate in the economies the company operates in (Koller, Goedhart, & Wessels, 2010). If a company violates this rule, it will eventually outgrow the rest of the economy, and become the economy itself. The Norwegian federal bank operates with a long-term target of 2% (Norges Bank, 2018). Both federal reserve (USA) and ECB (EU) operate with an inflation target close to 2%. These currently represent Tomra's largest markets. (Federal Reserve, 2018), (European Central Bank, 2018). Inflation targets may differ in future potential markets. Our expectations from the strategic analysis includes that the company will expand and grow in other markets in the future. Most of these markets needs to mature to make use of Tomra's technology. Under this assumption, we can argue that an overall inflation rate of 2% is reasonable. Damodaran (2012) claims that the terminal growth rate can be set lower than the economy's rate, because the economy is composed of high growth and stable growth firms. He also suggests that the stable growth rate should not exceed the risk-free rate used in the valuation. PwC's annual study shows that 2% and 2.5% are the most commonly used growth rates by analysts in the Norwegian market (PwC, 2017). It should be mentioned that preferences are different between industries and companies. We will use a terminal growth rate of 2% based on these different factors.

Capital expenditure is generally equal to depreciation in the calculation of terminal value, as it is assumed depreciation equals capital expenditure in the long run. (Tomra, 2016). However, we believe this is imprecise. It is hard to defend any growth in future earnings with no increase in expenditure on fixed assets. The terminal growth rate and expected stable ROC determines the reinvestment rate in the stable stage.

$$Reinvestment\ rate_s = ROC_s * g_s$$

It is sensible to look at industry averages to estimate future ROC. It is also sensible that the ROC will grow as operations can be executed more efficiently. This is a product of more experience and synergy effects. One problem occurs when determining which industry to compare with. Damodaran (2018) has prepared datasets containing the average ROC values for different industries. Tomra is included in the "Environmental & waste services"-industry in his

spreadsheets. We would like to argue that companies in the food processing industry also provides a fitting comparison. The peer group then consist of 202 western-European companies operating in these industries.

| Industry | ROC |
|---|---|
| Environmental & Waste Services | 13.4 % |
| Food Processing | 17.3 % |
| Average | 15.4 % |
| Total Market (without financials) | 11.0 % |

*Table 32: Industry average ROC. Source: (Damodaran 2018):*

The selected industries are generating a higher ROC that the total market (without financials). We will use the average from these two industries as ROC in the stable period. When multiplying the industry average ROC with the expected terminal growth rate (2%), we obtain a reinvestment rate of 13% in the terminal phase. This is significantly lower than today's rate of 45.1%, and more resembling of a mature company.

## 10.4 Qualitative aspects of growth

Free cash flow models are highly sensitive to growth rates. This underlines the significance of making reasonable assumptions.

Damodaran (2012) stresses the importance of qualitative aspects of growth. He argues that these factors have to show up in one or more growth inputs to determine growth. Some of these factors include:

- Quality of management
- Marketing strength
- Define reinvestment broadly
- Competition

Our growth estimation includes quantification of several qualitative factors. These factors were assessed in the strategic analysis chapter. Our view of their innovativeness is reflected in our belief of the company continuing to earn excess return on capital. Furthermore, our expectations of the company increasing its ROC in the future is partly based on this factor.

Our belief in Tomra's willingness to continue expanding through acquisitions is included as part of the capital expenditure. Thereby, we implicitly assume Tomra's acquisitive growth to

follow the trend of the past 5 years. The capitalization of R&D and operating lease commitments imply that we expect the company to grow from these activities as well.

As we already have stated, the high growth horizon and structure is based on qualitative factors, including the current competitive landscape.

## 10.5 Growth summary

We have now estimated growth rates in the main drivers of the free cash flow to firm model. The growth rates can provide meaningful insight when analyzing a firm.

Initially, we presented the historical growth rates in three different measures. It seems that the company wants to appear attractive to investors by maintaining dividend growth, even in years with negative growth in the other measures. This is not sustainable, given the company's stated payout ratio and stable number of shares outstanding.

Next, we addressed the company's own fundamentals to calculate expected growth rate. This rate shares some similarities with the historical growth rate. Although lower, it is still representing a company at a high growth stage. Finally, we argued for a terminal growth rate of 2%. One important remark is that the company is growing at the terminal rate in perpetuity. This applies to all metrics we examined in the "historical growth rates"-part. In, other words, we expect interest expenses to grow at the same rate as the EBIT. Setting one growth rate higher than the others would not make sense, as the historical deviation would grow into eternity. The different growth rates showcase the importance of excluding abnormal items. Adding for example the recent positive differences in foreign exchange translation would have led to bias in the forecasts.

We would like to point out one final observation in relation to growth. In the financial statements presented in chapter 6, a sudden increase in revenues can be observed from 2016 to 2017. Nonetheless, the EBIT declines during this period, indicating that growth in operating expenses has increased at a higher rate. This can be related to the recent ramp-up costs in Australia. This implies that the EBIT can increase at a higher rate in the future, if the revenues cover up the losses. The consolidated nature of the annual statements prevents us from investigating this further.

# 11 Forecast

We outlined the background each of the inputs in the past chapters. The forecast follows the suggested growth pattern, where the growth rate in EBIT abruptly declines from 5.3% to 2% in the terminal year. The company reaches a mature phase at the terminal stage. In addition to the falling growth rate, reinvestments are expected to represent a smaller share of the operating profits.

| Forecast | 2017 | 2018E | 2019E | 2020E | 2021E | 2022E |
|---|---|---|---|---|---|---|
| EBIT | 997.3 | 1050.5 | 1106.5 | 1165.5 | 1227.6 | 1293.1 |
| Growth in EBIT | | 5.3 % | 5.3 % | 5.3 % | 5.3 % | 5.3 % |
| Tax rate | 24 % | 23 % | 23 % | 23 % | 23 % | 23 % |
| EBIT(1-t) | 752.8 | 808.9 | 852.0 | 897.4 | 945.3 | 995.7 |
| Reinvestment | 435.9 | 473.9 | 499.2 | 525.8 | 553.8 | 583.3 |
| FCFF | 317.0 | 335.0 | 352.8 | 371.6 | 391.5 | 412.3 |

| Forecast | 2023E | 2024E | 2025E | 2026E | 2027E | Terminal |
|---|---|---|---|---|---|---|
| EBIT | 1362.0 | 1434.6 | 1511.1 | 1591.7 | 1676.6 | 1710.1 |
| Growth in EBIT | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| Tax rate | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| EBIT(1-t) | 1048.7 | 1104.7 | 1163.6 | 1225.6 | 1290.9 | 1316.8 |
| Reinvestment | 614.4 | 647.2 | 681.7 | 718.0 | 756.3 | 222.5 |
| FCFF | 434.3 | 457.5 | 481.9 | 507.6 | 534.6 | 1094.2 |

*Table 33: FCFF forecast*

# 12 Valuation

In this part, we will make use of the different valuation approaches to arrive at a target price for the company. The value estimate will be compared with the trading price to assess whether we would like to issue a buy, hold or sell recommendation. The estimate is based on a fundamental valuation, supplemented by a relative valuation. The chapter is concluded with a scenario analysis based on a recent significant announcement.

## 12.1 The intrinsic approach

We estimated future cash flows in the last chapter. These cash flows are basis of a valuation where we discount the forecasted values to present values.

### 12.1.1 FCFF

We can now examine the FCFF valuation. The two-stage growth pattern leads to the following formula:

$$Value\ of\ firm = \sum_{t=1}^{t=n} \frac{FCFF_t}{(1+WACC_{hg})^t} + \frac{[FCFF_{n+1}/(WACC_{st}-g)]}{(1+WACC_{hg})^n}$$

Where:

$$FCFF = Free\ cash\ flow\ to\ firm$$

$$WACC = Cost\ of\ capital\ (hg: high\ growth, st: stable\ growth)$$

$$g = Growth\ in\ terminal\ phase$$

The present value of cash flows from the high growth period is as follows:

| 2-stage FCFF | 2018E | 2019E | 2020E | 2021E | 2022E |
|---|---|---|---|---|---|
| FCFF | 335.0 | 352.8 | 371.6 | 391.5 | 412.3 |
| High WACC | 4.9 % | 4.9 % | 4.9 % | 4.9 % | 4.9 % |
| PV | 319.2 | 320.4 | 321.6 | 322.7 | 323.9 |
| | | | | | |
| 2-stage FCFF | 2023E | 2024E | 2025E | 2026E | 2027E |
| FCFF | 434.3 | 457.5 | 481.9 | 507.6 | 534.6 |
| High WACC | 4.9 % | 4.9 % | 4.9 % | 4.9 % | 4.9 % |
| PV | 325.1 | 326.3 | 327.5 | 328.8 | 330.0 |

*Table 34: Present value, high growth-stage*

The sum of the present values of the cash flows in the high growth period is 3245.5 NOK. We can now calculate the present value of the terminal phase to find the enterprise value of Tomra.

| Terminal phase | |
|---|---|
| FCFF n+1 | 1094.2 |
| Stable g | 2.00 % |
| Stable WACC | 5.50 % |
| Value of stable growth | 31304.6 |
| PV of stable growth | 18334.5 |

*Table 35: Present value of stable growth-stage*

The present value of the terminal phase is 18334.5 NOK. The total enterprise value of Tomra is then 21580.1 NOK. To obtain the value of equity, we deduct net debt and minority interest from the enterprise value. Then we divide the value of equity on shares outstanding to find the intrinsic value per share. Tomra currently has 148 020 000 shares outstanding (Tomra Systems ASA, 2018a).

| 2-Stage FCFF | |
|---|---|
| Total PV | 21580.1 |
| Net debt | 2111.3 |
| Non-controlling interest | 143.3 |
| PV of equity | 19325.5 |
| Shares outstanding | 148.0 |
| Value per share | 130.6 |

*Table 36: FCFF, value per share.*

The value per share of Tomra is 130.6 NOK through the 2-stage FCFF model.

## 12.2 The market approach

We will initiate this subchapter by showing Tomra's historical multiples.

| Tomra | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Market cap. | 9177.2 | 10028.4 | 12618.7 | 13876.9 | 24275.3 |
| Enterprise value | 12183.5 | 13276.7 | 16258.3 | 17115.4 | 28274.2 |
| TTM EBITDA | 1053.0 | 1095.6 | 1440.4 | 1592.5 | 1584.4 |
| TTM Earnings | 403.6 | 427.6 | 651.6 | 725.2 | 702.1 |
| BV equity start | 3297.5 | 3820.4 | 4565.3 | 4856.7 | 5321.7 |
| TTM P/E | 22.7 | 23.5 | 19.4 | 19.1 | 34.6 |
| TTM P/B | 2.8 | 2.6 | 2.8 | 2.9 | 4.6 |
| TTM EV/EBITDA | 11.6 | 12.1 | 11.3 | 10.7 | 17.8 |

*Table 37: Historical multiples, Tomra.*

Table 37 shows historical trailing multiple values for Tomra. The market capitalization is calculated from the stock price on the release date of the associated (trailing) annual report. The multiples have remained relatively stable in the past. The significant increase in 2018 is caused

by a soaring stock price. We believe this is related to the recent acquisition of Compac in the sorting segment, and market expansion in the collection segment. In addition, the possibilities of a bottle deposit scheme in the UK has driven the price to new heights. We will come back to this possible scenario later in the valuation. The increase all multiples shows that expectations of future activities and possibilities has increased instantly. It is, however, important that we put history aside when finding a value through multiples. Only the numbers from 2018 are relevant, as it reflects the current pricing of the company.

As we explained earlier, the market approach to valuation involves looking at comparable firms to derive a target price for the company of analysis. An essential prerequisite for using this type of models, are the presence of comparable firms. The most common approach is to compare peer groups, primarily in the same segments. Furthermore, the estimate is more reliable if the comparable companies have approximately the same capital structure. Tomra is listed as an industry company on Oslo stock exchange. However, the complexity of the company leads to problems when using a market approach. We introduced some of Tomra's main competitors in the introduction chapter. None of these are fully involved in exactly the operations as Tomra. One possible approach would be to derive a weighted average multiple partly based on companies entirely in the sorting segment and partly on companies in the collection segment. Tomra's largest competitor in the collection segment, Diebold Nixdorf, are heavily involved in several other unrelated segments. It would make no sense to compare two companies with similarities only in a small portion of their activities. Several of Tomras main competitors are private companies, especially in the sorting market. Multiples always include the market value of equity or the enterprise value. Therefore, private companies cannot be included in the peer group. With that in mind, we believe a market valuation approach would be difficult implement by looking at Tomra's competitors. We should look at alternative approaches. We will apply Damodaran's (2018) datasets for multiples in similar industries, as we did for the terminal ROC-value in chapter 10. The peer group consist of 202 western-European companies operating within "Environmental & waste services and "Food processing" industries. Before presenting the numbers, we should decide whether we wish to use forward or trailing estimates. The forward leading multiple contains a projected number in the denominator. The trailing multiple, on the other hand, contains the most recent accounting value. While there are pros and cons with both approaches, research suggest that forward leading multiples are more accurate (Liu, Nissim, & Thomas, 2002). The dataset for P/E multiples contains forward leading

estimates. We will use trailing multiples for the two other multiples, as it would be far too time consuming to project values for the whole peer group.

| Industry | Forward P/E | TTM P/B | EV/EBITDA |
|---|---|---|---|
| Environmental & Waste Services | 18.6 | 3.7 | 11.8 |
| Food Processing | 35.2 | 3.2 | 13.4 |
| Average | 26.9 | 3.4 | 12.6 |

*Table 38: Industry average multiples.*

### 12.2.1 Price multiples

The industry P/E contains a forward leading component in the earnings input. This requires us to forecast net income, in order to obtain a consistent estimate. In chapter 10, we discovered that EBIT and net income has been growing at the approximately the same rate in the past. For simplicity's sake, we will use the fundamental growth in EBIT of 5.1%, and assume net income will grow at the same rate in 2018. With the forecasted earnings, we obtain a forward P/E of 32.8 for Tomra.

The P/B is calculated with trailing balance value of equity. The ending book value of equity from 2017 is the denominator in this calculation.

| | Forward P/E | Trailing P/B |
|---|---|---|
| Market capitalization | 21327.0 | 18333.2 |
| Shares outstanding | 148.0 | 148.0 |
| Value per share | 144.1 | 123.9 |

*Table 39: Earnings multiples.*

The table shows implied value of one share of Tomra based on price multiples. The price multiples yield somewhat different estimates. The P/B suggests that the stock is trading at a considerable premium. The P/E method shows a higher estimate, closer to the current trading price.

### 12.2.2 Enterprise multiple

Like the FCFF valuation model, the EV/EBITDA multiple is used to derive enterprise value, rather than value of equity. Thus, net debt and minority interest should be deducted from the estimate to arrive at a value of equity.

| | EV/EBITDA |
|---|---|
| Enterprise value | 19971.2 |
| Net debt | 2111.3 |
| Minority interest | 143.3 |
| Value of equity | 17716.6 |
| Shares outstanding | 148.0 |
| Value per share | 119.7 |

*Table 40: Enterprise multiple.*

The value per share is close to the estimate derived from the P/B multiple, indicating that the stock is trading at a premium.

## 12.3 Scenario analysis

While the sorting segment is expected to grow at a steady rate, new opportunities are constantly developing in the collection segment. Some of these opportunities may have influence on our valuation. Tomra has historically introduced their collection products to smaller markets at a quite steady pace. The company has recently entered Northern territory and New South Wales in Australia, in addition to the Lithuanian market. All these expansions found place during our period of analysis Thus, it can be argued that Tomra's ramp-up revenues and expenditures related to smaller markets are reflected in the cash flows.

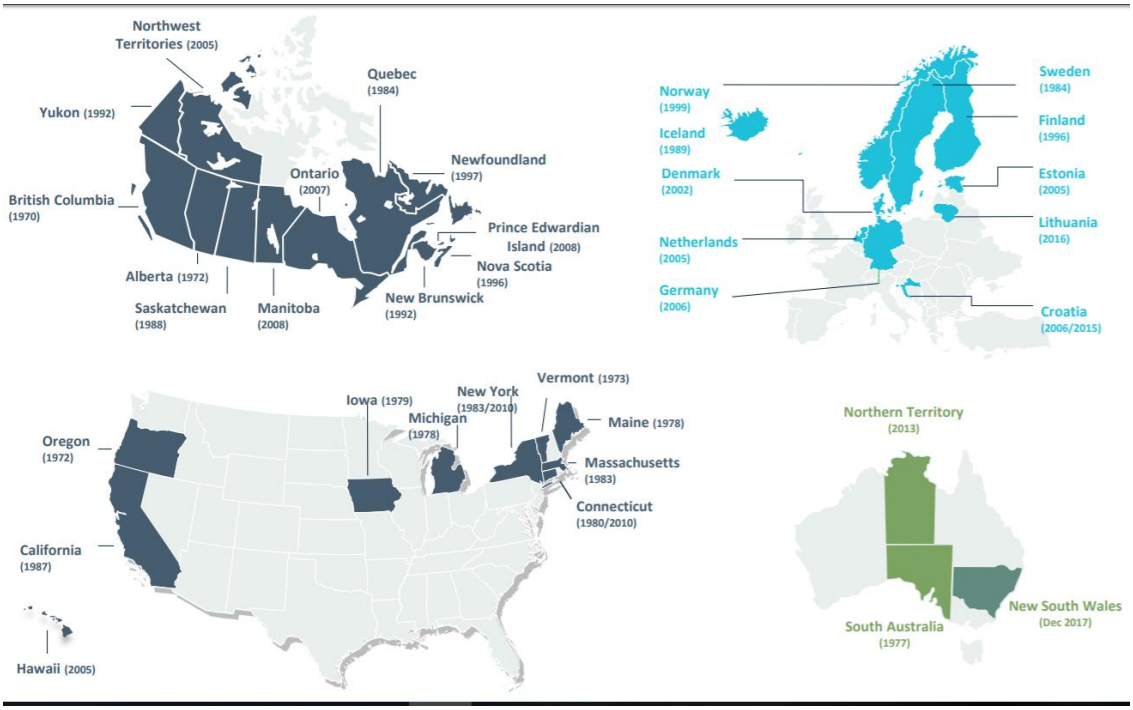


*Figure 15: Operating areas, collection solutions. (Tomra Systems ASA, 2017b)*

Every once in a while, regulatory changes in a market presents huge opportunities for the company. Germany is one such market. On March 28. 2018, The UK government announced plans for a bottle and cans return scheme in England. (Department for Environment, Food & Rural Affairs, 2018). A consultation period is yet to be held before the policy is introduced, which makes 2019 or 2020 the earliest period for implementation. If the policy is accepted, the UK has potential to become Tomra's second largest market within the collection segment as the British consumption of beverages is estimated to be 13 billion plastic bottles each year. The scheme is set to effect England, but Scotland and Wales are working on similar schemes (British Broadcasting Corporation, 2018), (Amos, 2017). There are no signs of such measures being introduced in Northern Ireland yet. It is therefore reasonable to assume that the potential market equals the population of Great Britain. According to the office of national statistics, the population of Great Britain was 63.8 million in 2017 (Office for National Statistics, 2017). The German population was 83.1 million at the same time (Population Reference Bureau, 2017). That means the potential new market is roughly about 77% of the size of the German market.

The first step in this valuation is to estimate the free cash flows from the potential new market. The annual statements are consolidated and provide limited information on the separate markets. Some assumptions must be made. We would like to emphasize that these estimates by no means are meant to be completely accurate.

It is important to note that the potential added cash flows are solely generated from reverse vending operations. 30000 or about 36.6% of all installed reverse vending machines are installed in Germany.

| REVERSE VENDING | |
|---|---|
| Nordic | ~15,100 |
| Germany | ~30,000 |
| Other Europe | ~14,600 |
| North America | ~16,000 |
| Rest of the world | ~6,300 |
| **TOTAL** | **~82,000** |

*Figure 16: Reverse vending machines installed. (Tomra Systems ASA, 2017b)*

The operating margins are higher in the collection segment than the sorting segment. Tomra reports EBIT for each segment in their annual statement. Reverse vending activities accounts for about 73% of the revenues in the collection segment. These activities are closely related to

the material recovery activities. Therefore, no profit margin adjustments will be done to the reported numbers.

With these ratios in mind, we estimate that an EBIT of 173.4 mNOK is generated from the German market. Knowing the relative size of the new potential market, we believe it has the potential to generate an additional EBIT of 133.5 mNOK at a mature stage. The number implicitly carry the assumption of the market share in Great Britain being the same as in Germany. Tomra's market share in the German RVM market is currently 70% (Doyle & Skonnord, 2018) The estimate makes sense when comparing it to the total EBIT of the company, as it implies a higher than average operating margin. This is in line with the margins in the collection segment relative to the sorting segment.

We should look further back in the past to evaluate the growth rate of the German collection market since its inception. Unfortunately, Tomra reported even less detailed numbers in the mid- 2000s. Tomra installed 8800 RVMs in their first year of business in Germany, 2400 in the second year and about 2500 machines every year onwards (including replacements). The last number is an approximation, as they do not include numbers on machines installed in every annual statement. The key takeaway is that the installment rate has been quite stable after the initial year, when adjusting for cyclicality. If we assume all costs to be variable, we can tie EBIT to machines installed to derive a growth rate. This rate seems to be fairly stable after the initial year, meaning the growth rate should abruptly fall to the perpetual rate we argued for in the growth chapter after the first year.

The next step is to estimate reinvestments. As mentioned in the reinvestment needs chapter, reinvestments are made up of several factors. As the overall company is in a high growth phase, it can be argued that current reinvestment needs are representative. R&D activities in the collection segment should relate to all markets, as Tomra strives to deliver efficient products in every market. Their core technology is focused around sensor based solutions. This applies to all business areas of the company. Furthermore, the remaining reinvestments are believed to follow the current rate and drop to the stable reinvestment rate after one year.

| UK | 2019 | 2020 | Total |
|---|---|---|---|
| EBIT | 501.9 | 136.2 | |
| (Re)Investment | 226.5 | 17.7 | |
| FCFF | 275.5 | 118.5 | |
| Value | 275.5 | 3388.7 | |
| Market cap/EV | 92 % | 92 % | |
| Value of equity | 253.4 | 3117.6 | |
| PV | 230.1 | 2801.2 | |
| Shares outstanding | 148.0 | 148.0 | |
| Value per share | 1.6 | 18.9 | 20.5 |

*Table 41: Value from UK market*

Our scenario analysis aims to explain how the potential expansion of Tomra Collection Solutions in the British market affect the company value. The size of the market shows a potential significant increase in profits from investing in this area. The possible value of this opportunity is regarded as independent from the value estimate conducted in the main valuation.

However, due to uncertainties with regards to the details of the legislation and the competitive landscape, we have constructed a decision tree that weigh the probability of each outcome with the expected cash flow from the investment. The intent of doing a scenario analysis is to get a better sense of how the riskiness affects the value of this investment (Damodaran, 2012)

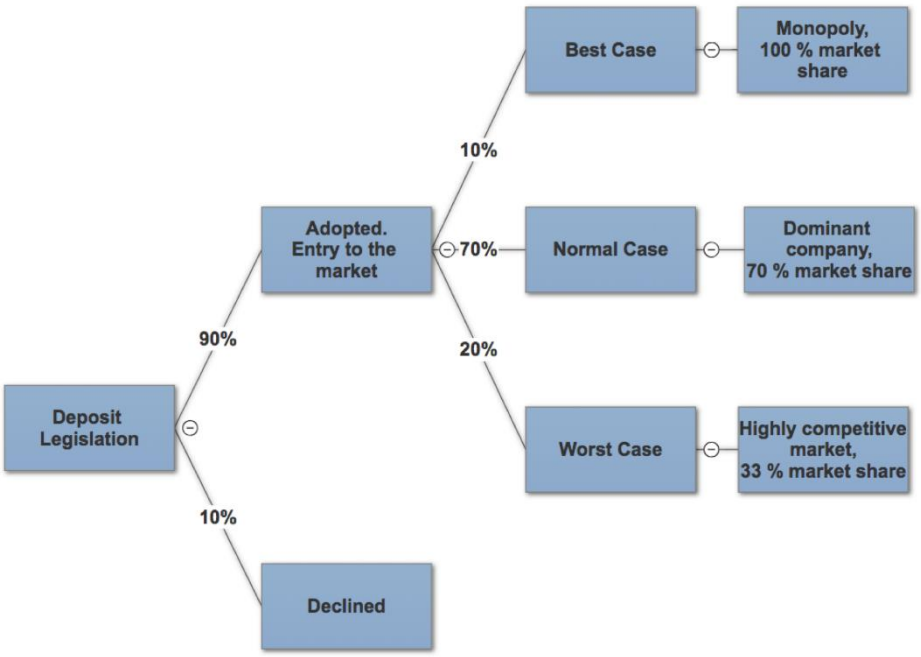


*Figure 17: Decision tree, UK market.*

The first step is weighed after the probability for the UK government to implement this legislation. Based on the government's proclamation to the public, we have determined that the probability of implementation of deposit legislation is likely to be high. For this reason, the probability is set to 90% for favorable implementation and 10% for unfavorable implementation. We believe that this is an appropriate probability estimate that reflects the most likely decision but still includes a tiny degree of uncertainty. We expect Tomra to enter the market if the deposit legislation is implemented unless unexpected barriers prevent the entry to the British market. This might be that the delivery of reverse vending machines is exclusive to a British supplier.

If all factor conditions for a successful entry is adhered, we have structured their success in best case, a most likely (base) case and worst case scenarios. To weight the numerical probability in each case is difficult because of the uncertainty associated with governmental decisions.

The most likely scenario implies a successful entry to the British market and a claim of 70 percent market share. This assumption is made based on Tomra's market share in the German reverse vending market, which is a market of similar size to the British. With a 70 percent market share in the British market, entry will provide a substantial increase in revenue. The probability for this outcome is regarded as high. We assume this to be the most likely scenario and assign a 70 percent probability to this outcome. This is based on Tomra's dominance in this collection segment world-wide. We believe that Tomra has the ability to benefit from scale economy and sell their machines at lower cost compared to their competitors. The most likely scenario gives an estimated value of **20.5 NOK** per share**.** The FCFF outputs the implied value of total capital for the project. If we assume the project to be financed at the same rate as the overall capital structure, we should adjust for net debt and minority interest.

The best-case scenario implies a successful entry to the full extent of the British market. This case assumes absence of competition in the market segment and close to monopoly situation for Tomra. The company will have the possibility to claim a 100 percent market share and the cash flow associated with this investment. By claiming a 100 percent market share, we adjust the present value of the normal case to reflect the extra earnings. This scenario is tainted by the difficulties of maintaining a monopoly. In order to keep the monopoly, Tomra has to be the sole provider of all machines and keep entry barriers too high for competitors to enter. We assume this to be a plausible outcome, but expect the probability of this to be relatively low. We have assumed a 10 percent probability for Tomra to obtain a monopoly in the British market. To

obtain the value per share in a monopoly situation we have adjusted the normal case estimate for a 100 percent market share. This gives a value estimate of **29.3 NOK** per share.

In a worst-case scenario, we still expect the British government to implement the deposit legislation, but the competitive situation makes entry difficult. We assume a few large companies will have the ability to compete with Tomra and expect a market share of 33 percent in this case. We have assigned a 20 percent probability of this outcome. The reason for this probability is that Tomra as the world's largest provider of reverse vending machines should be able to outperform smaller competitors by taking advantage of its economy of scale and therefore offer a better price for the customer. However, we believe that the possibility of a highly competitive market is larger than the possibility of a monopoly. By adjusting the normal case present value for a 33% market share we obtain a value estimate of **9.7 NOK** per share.

After weighting the probability of each outcome with the estimated cash flow from each of the scenarios we conclude obtain an expected value of entry to the British market. The expected value of this investment is given by:

$$E(v) = p_1 \times (p_0(PV_b) + p_n(PV_n) + p_w(PV_w))$$

Where:

$$p_1 = Probability\ of\ legislation$$

$$p_b = Probability\ of\ best\ case\ scenario$$

$$p_n = Probability\ of\ normal\ case\ scenario$$

$$p_w = Probability\ of\ worst\ case\ scenario$$

$$PV_b = Present\ value\ in\ best\ case\ scenario$$

$$PV_n = Present\ value\ in\ normal\ case\ scenario$$

$$PV_w = Present\ value\ in\ worst\ case\ scenario$$

| UK | PV | Probability |
|---|---|---|
| Best case | 29.3 | 10 % |
| Base case | 20.5 | 70 % |
| Worst case | 9.7 | 20 % |
| E(v) | 17.3 | |

*Table 42: Present values of scenarios*

Combining the estimated cash flows with the probabilities, yields an expected value of **17.3 NOK** per share.

By adding the risk adjusted estimated value of successful entry on the British market to our estimated value of Tomra, the total value of Tomra is given as:

$$VPS^* = (VPS + VPS_{UK})$$

Where:

$$VPS = Value\ per\ share\ from\ nonUK\ markets$$

$$VPS_{UK} = Value\ per\ share\ from\ UK\ market$$

## 12.4 Value estimate

The different models yield different estimates of the value of one share in Tomra. When deciding which model to emphasize, it is important to look past the numbers.

The estimates from the intrinsic approach and the market approach are relatively similar. The estimated value from the FCFF model equals 130.6 NOK. All multiples suggest that the stock is trading at a premium. The average of these three estimates suggests a fair stock value of 129.2 NOK. This sounds like a reasonable estimate, given the recent soaring trend in the stock price. It is also very close to our intrinsic value estimate. However, the multiple valuation is based on the averages from very different industries. This adds to the uncertainty of the estimate. We believe Tomra's dominant position and recent events in the collection segment may influence the current price of the share. In other words, Tomra's dominant position and opportunities are omitted from this estimate. We believe the intrinsic valuation we have done is far more comprehensive, as it includes some qualitative and idiosyncratic factors. We will therefore base our valuation completely on the intrinsic valuation. The relative valuation has served the propose method triangulation.

The scenario analysis is of utmost relevance. The timing, scope and significance of the scenario required us to treat this as a separate event. Earnings and growth from the possible expansion

are not reflected in the annual statements. If we assume the stock market to be at least semi-efficient (Fama, 1970) then this information should be included when comparing the target price to the prevailing stock price. The sudden movement in the stock price following the announcement is evidence of the information being "new". Our value estimate is therefore based on the intrinsic valuation and the scenario analysis. Utilizing the formula shown at the end of the last subchapter, the combined intrinsic value per share is **147.8 NOK.** This represents a downside of 7.5% from the current trading price of **159.8 NOK.** We feel confident issuing a buy or sell recommendation if the value deviate from the trading price with +-10%. The upper limit is then set at 175.8 NOK, while the lower limit is set at 143.8 NOK. However, before issuing a recommendation we need to address the uncertainty of the inputs in these models.

# 13 Sensitivity analysis

There is some uncertainty attached to the inputs of the valuation. In this part, we will analyze several of these inputs. The purpose of the analysis is to map the uncertainty of these variables, and how this effects the value estimate. We will assess both positive and negative changes and isolate the effects of the inputs. For example: In chapter 10, we showed that the fundamental growth rate depends on the reinvestment rate. However, in the sensitivity analysis, we will assume that the growth rate will remain the same under different reinvestment rates.

## 13.1 Growth rate

In our intrinsic valuation, we made use of the fundamental growth rate to forecast EBIT during the high growth phase. This rate is important to both the cash flows during this phase, and the estimated cash flow in the terminal phase. In addition, it has implications for the reinvestment rate which is represented as a percentage of EBIT.

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| High growth rate | 3.73 % | 4.27 % | 4.80 % | 5.33 % | 5.87 % | 6.40 % | 6.93 % |
| Value estimate | 122.4 | 130.5 | 139.0 | 147.8 | 157.1 | 166.7 | 176.7 |
| Change in estimate | -17.2 % | -11.7 % | -6.0 % | 0.0 % | 6.3 % | 12.8 % | 19.6 % |

*Table 43: Sensitivity, high growth rate*

## 13.2 Terminal growth rate

The terminal growth rate is difficult to predict. We argued for a terminal growth rate of 2% in our intrinsic valuation. There are several arguments for using an alternative growth rate. However, we trust that our analysis includes the most important factors.

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| Stable growth rate | 1.4 % | 1.6 % | 1.8 % | 2 % | 2.2 % | 2.4 % | 2.6 % |
| Value estimate | 126.6 | 133.0 | 140.0 | 147.8 | 156.6 | 166.5 | 177.8 |
| Change in estimate | -14.3 % | -10.0 % | -5.3 % | 0.0 % | 6.0 % | 12.7 % | 20.3 % |

*Table 44: Sensitivity, terminal growth rate*

A 20% increase in the terminal growth rate closes the gap between the prevailing stock price and our estimate. Our analysis shows that the value estimate is more sensitive to changes in the high growth rate.

## 13.3 Reinvestment rate

Reinvestment rate consist of two main components: net capital expenditures and change in working capital. Changes in reinvestment rates has several implications for the estimated value. It is a crucial input in the free cash flow calculation. In addition, it affects the growth rate. We

will not assess the change in growth, to better showcase the isolated effect of increased reinvestments. It is therefore assumed that the company must reinvest less or more to obtain the same growth rate. We have calculated reinvestment rate as a percentage of EBIT. This ratio is different from the high-growth to the stable growth periods. The reinvestment rate calculated for the high growth stage equals 45.1%, while it decreases to 13% in the stable growth phase.

### 13.3.1 High growth reinvestment rate

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| High reinvestment rate | 31.6 % | 36.1 % | 40.6 % | 45.1 % | 49.6 % | 54.1 % | 58.7 % |
| Value estimate | 157.5 | 154.3 | 151.0 | 147.8 | 144.6 | 141.4 | 138.2 |
| Change in estimate | 6.1 % | 4.2 % | 2.1 % | 0.0 % | -2.2 % | -4.5 % | -6.9 % |

*Table 45: Sensitivity, high growth reinvestment rate*

The estimate is less sensitive to changes in this variable, than in growth. The outcomes have a maximum deviation of 19.3%, when analyzing a range of +- 30%.

### 13.3.2 Stable growth reinvestment rate

Terminal growth rate is an exogenous variable, which affects the associated reinvestment rate. The assumption of an unaffected growth rate will therefore apply to these calculations as well.

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| Stable reinvestment rate | 9.1 % | 10.4 % | 11.7 % | 13.0 % | 14.3 % | 15.6 % | 16.9 % |
| Value estimate | 156.1 | 153.3 | 150.6 | 147.8 | 145.1 | 142.3 | 139.6 |
| Change in estimate | 5.6 % | 3.8 % | 1.9 % | 0.0 % | -1.8 % | -3.7 % | -5.6 % |

*Table 46: Sensitivity, stable reinvestment rate*

Although the reinvest is lower in the stable phase, the relative changes almost have the same effect as changes in high growth reinvestment rate, on the value estimation.

## 13.4 WACC

The WACC consist of the risk-free rate, beta and the equity risk premium. There is considerable uncertainty connected to the calculation of these numbers. We will now show how this uncertainty, presented as changes in WACC, affects the value.

### 13.4.1 High growth WACC

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| High WACC | 3.5 % | 4.0 % | 4.5 % | 4.9 % | 5.4 % | 5.9 % | 6.4 % |
| Value estimate | 149.7 | 149.0 | 148.4 | 147.8 | 147.3 | 146.7 | 146.2 |
| Change in estimate | 1.3 % | 0.8 % | 0.4 % | 0.0 % | -0.4 % | -0.7 % | -1.1 % |

*Table 47: Sensitivity, high growth WACC*

The high growth WACC is used to discount free cash flows from the high growth period. That is, year 1 to 10 in our forecast. These cash flows accounts for a small part of the total cash flows. Consequently, the estimate is rather insensitive to changes in the associated discount rate.

### 13.4.2 Stable growth WACC

We used a different discount rate for the cash flows generated by the company at a mature state. This WACC is slightly higher, due to an increment in the beta.

| | -30 % | -20 % | -10 % | 0 % | +10% | +20% | +30% |
|---|---|---|---|---|---|---|---|
| Stable WACC | 3.8 % | 4.4 % | 4.9 % | 5.5 % | 6.0 % | 6.6 % | 7.1 % |
| Value estimate | 313.6 | 232.4 | 182.0 | 147.8 | 123.3 | 104.9 | 90.6 |
| Change in estimate | 112.2 % | 57.2 % | 23.1 % | 0.0 % | -16.6 % | -29.1 % | -38.7 % |

*Table 48: Sensitivity, stable growth WACC*

The estimate is very sensitive to changes in this WACC. It is used to discount the perpetual cash flows after the initial high growth stage. A 10% increase in the stable WACC leads to a negative 16.6% change in the estimate. The WACC is more sensitive to negative changes, leading to a high potential upside. However, we believe the lowest WACC values in this sample is highly to unlikely to represent the real world.

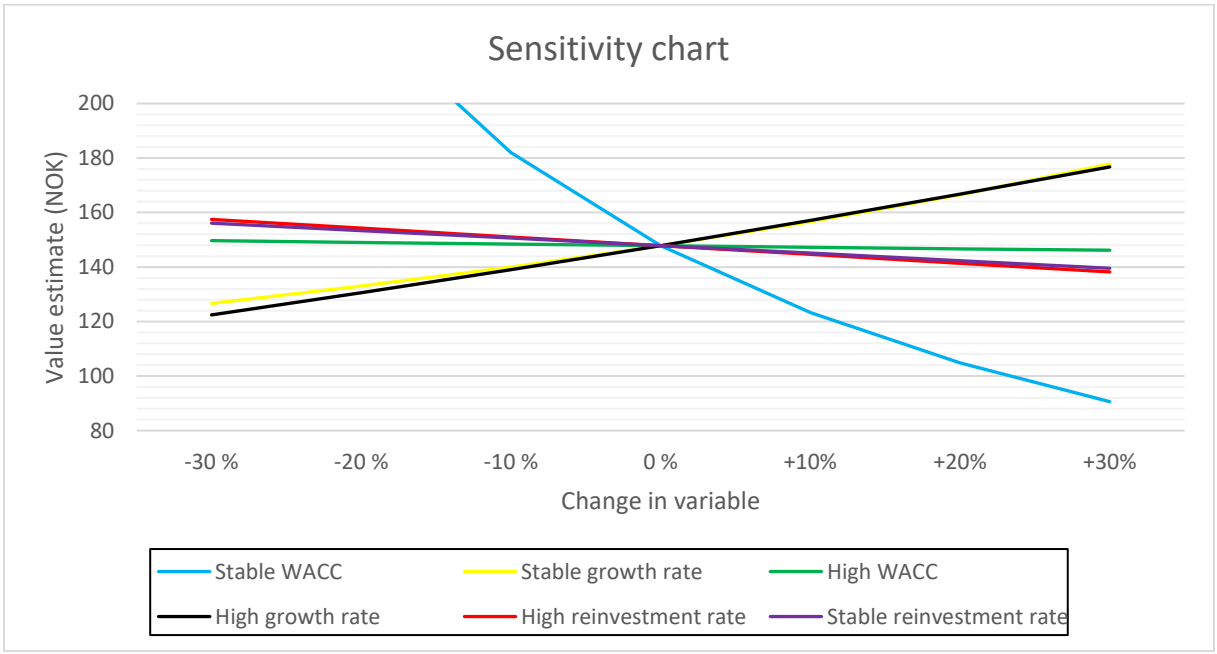


*Figure 18: Sensitivity chart*

Figure 17 summarizes the sensitivity of the estimate regarding changes in different input variables. We have zoomed in to better show the effect of changes in all variables. Effects from changes in the stable WACC is non-linear, due its inclusion in the terminal value part of the 2-stage FCFF-model formula.

## 13.5 Probability of implementation in UK

The added present value from the scenario analysis accounts for only a small part of the total present value. Therefore, we will present how both the project value and the total value is affected from changes in scenario effect of changes in probability of legislation being introduced.

| | -50 pp | -40 pp | -30 pp | -20 pp | -10 pp | 0 % | +10 pp |
|---|---|---|---|---|---|---|---|
| Probability of legislation | 40 % | 50 % | 60 % | 70 % | 80 % | 90 % | 100 % |
| Value estimate UK | 7.7 | 9.6 | 11.5 | 13.4 | 15.4 | 17.3 | 19.2 |
| Change in UK estimate | -55.5 % | -44.5 % | -33.5 % | -22.5 % | -11.0 % | 0.0 % | 11.0 % |
| Value estimate | 138.2 | 140.2 | 142.1 | 144.0 | 145.9 | 147.8 | 149.8 |
| Change in estimate | -6.5 % | -5.1 % | -3.9 % | -2.6 % | -1.3 % | 0.0 % | 1.4 % |

*Table 49: Sensitivity, probability of legislation*

The changes in probability of legislation is here given as percentage points, to prevent probabilities from equaling more or less than 100%. Small changes in the legislation probability has large effects on the value estimate from the possible new market. On an aggregate level, the changes are small. A downgrade to 40% change of legislation leads to a -6.5% change in the value estimate.

## 13.6 Summary

The large potential upside related to changes in stable growth WACC should be considered when issuing a recommendation. Our own calculations in chapter 9 implies that the equity risk premium, in fact has been very high during the last 5 years. As we mentioned, we consider the chance of the actual WACC being under 4% as very low. We can then argue that the realistic possibilities of the WACC being larger and the large potential upside equalizes each other. The results from sensitivity analysis has not convinced us to make any adjustments of the recommendation.

# 14 Conclusion

The purpose of this paper was to estimate the value of one share of Tomra Systems ASA. Our estimate yields a value of one share of Tomra equal to **147.8 NOK**. This represents a downside of 7.5% from the current price of 159.8. The valuation has been conducted through a qualitative and quantitative part. The qualitative part contributed with a narrative, on which we based our assumptions. The value has been derived from an intrinsic valuation model and a scenario analysis of a new possible market. Therefore, the estimate somewhat reflects the subjective opinion of the analysts.

The strategic analysis and financials tells a story of a purposeful, solid and stable company in a growing industry. The macro environment shows a megatrend in waste management and solutions for this is in high demand. However, from an investment perspective we will issue a **HOLD** recommendation for Tomra Systems ASA.

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# 16 Appendix

## 16.1 Financial items (extended)

| Financial items | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Interest income | 10 | 8 | 14 | 9.7 | 9.4 | 10.6 |
| Other financial income | 0 | 0 | 0 | 0 | 0 | 22.2 |
| ForEx gain | 0 | 0 | 4.6 | 0 | 53.3 | 0 |
| Total financial income | 10 | 8 | 18.6 | 9.7 | 62.7 | 32.8 |
| | | | | | | |
| Interest expenses | -35.4 | -35.7 | -36.6 | -19.5 | -15.9 | -19.1 |
| Other financial expenses | -7 | -9.8 | -9.5 | -7.9 | -30.6 | -6.4 |
| ForEx loss | -6.2 | -9 | 0 | -15.1 | 0 | -31 |
| Total financial expenses | -48.6 | -54.5 | -46.1 | -42.5 | -46.5 | -56.5 |

## 16.2 Operating lease commitments

| Year (2017) | Commitment | Present Value |
|---|---|---|
| 1 | 82.4 | 80.4 |
| 2 | 82.4 | 78.5 |
| 3 | 82.4 | 76.6 |
| 4 | 82.4 | 74.8 |
| 5 | 82.4 | 73.0 |
| 6 and beyond | 74.8 | 366.0 |
| Debt Value of leases | | 749.4 |

| Year (2016) | Commitment | Present Value |
|---|---|---|
| 1 | 74.7 | 72.9 |
| 2 | 74.7 | 71.1 |
| 3 | 74.7 | 69.5 |
| 4 | 74.7 | 67.8 |
| 5 | 74.7 | 66.2 |
| 6 and beyond | 65.2 | 367.8 |
| Debt Value of leases | | 715.3 |

| Year (2015) | Commitment | Present Value |
|---|---|---|
| 1 | 65.3 | 63.7 |
| 2 | 65.3 | 62.2 |
| 3 | 65.3 | 60.7 |
| 4 | 65.3 | 59.3 |
| 5 | 65.3 | 57.8 |
| 6 and beyond | 56.6 | 276.7 |
| Debt Value of leases | | 580.4 |

| Year (2014) | Commitment | Present Value |
|---|---|---|
| 1 | 50.7 | 49.5 |
| 2 | 50.7 | 48.3 |
| 3 | 50.7 | 47.1 |
| 4 | 50.7 | 46.0 |
| 5 | 50.7 | 44.9 |
| 6 and beyond | 47.0 | 194.0 |
| Debt Value of leases | | 429.7 |

| Year (2013) | Commitment | Present Value |
|---|---|---|
| 1 | 38.7 | 37.8 |
| 2 | 38.7 | 36.9 |
| 3 | 38.7 | 36.0 |
| 4 | 38.7 | 35.2 |
| 5 | 38.7 | 34.3 |
| 6 and beyond | 32.3 | 107.8 |
| Debt Value of leases | | 288.1 |

| Year (2012) | Commitment | Present Value |
|---|---|---|
| 1 | 36.1 | 35.2 |
| 2 | 36.1 | 34.4 |
| 3 | 36.1 | 33.6 |
| 4 | 36.1 | 32.8 |
| 5 | 36.1 | 32.0 |
| 6 and beyond | 31.8 | 80.6 |
| Debt Value of leases | | 248.5 |

## 16.3 R&D

| Year 2017 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2017 | 276.4 | 100 % | 276.4 | 0.0 |
| 2016 | 244.4 | 80 % | 195.5 | 48.9 |
| 2015 | 232.2 | 60 % | 139.3 | 46.4 |
| 2014 | 197.5 | 40 % | 79.0 | 39.5 |
| 2013 | 186.7 | 20 % | 37.3 | 37.3 |
| 2012 | 205.2 | 0 % | 0.0 | 41.0 |
| Value R&D asset | | | 727.6 | |
| Total amor. This year | | | | 213.2 |

| Year 2016 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2016 | 244.4 | 100 % | 244.4 | 0.0 |
| 2015 | 232.2 | 80 % | 185.8 | 46.4 |
| 2014 | 197.5 | 60 % | 118.5 | 39.5 |
| 2013 | 186.7 | 40 % | 74.7 | 37.3 |
| 2012 | 205.2 | 20 % | 41.0 | 41.0 |
| 2011 | 179.7 | 0 % | 0.0 | 35.9 |
| Value R&D asset | | | 664.4 | |
| Total amor. This year | | | | 200.3 |

| Year 2015 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2015 | 232.2 | 100 % | 232.2 | 0.0 |
| 2014 | 197.5 | 80 % | 158.0 | 39.5 |
| 2013 | 186.7 | 60 % | 112.0 | 37.3 |
| 2012 | 205.2 | 40 % | 82.1 | 41.0 |
| 2011 | 179.7 | 20 % | 35.9 | 35.9 |
| 2010 | 172.8 | 0 % | 0.0 | 34.6 |
| Value R&D asset | | | 620.2 | |
| Total amor. This year | | | | 188.4 |

| Year 2014 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2014 | 197.5 | 100 % | 197.5 | 0.0 |
| 2013 | 186.7 | 80 % | 149.4 | 37.3 |
| 2012 | 205.2 | 60 % | 123.1 | 41.0 |
| 2011 | 179.7 | 40 % | 71.9 | 35.9 |
| 2010 | 172.8 | 20 % | 34.6 | 34.6 |
| 2009 | 144.1 | 0 % | 0.0 | 28.8 |
| Value R&D asset | | | 576.4 | |
| Total amor. This year | | | | 177.7 |

| Year 2013 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2013 | 186.7 | 100 % | 186.7 | 0.0 |
| 2012 | 205.2 | 80 % | 164.2 | 41.0 |
| 2011 | 179.7 | 60 % | 107.8 | 35.9 |
| 2010 | 172.8 | 40 % | 69.1 | 34.6 |
| 2009 | 144.1 | 20 % | 28.8 | 28.8 |
| 2008 | 170.3 | 0 % | 0.0 | 34.1 |
| Value R&D asset | | | 556.6 | |
| Total amor. This year | | | | 174.4 |

| Year 2012 | R&D expense | Unamortized % | Unamortized NOK | Amortization this year |
|---|---|---|---|---|
| 2012 | 205.2 | 100 % | 205.2 | 0.0 |
| 2011 | 179.7 | 80 % | 143.8 | 35.9 |
| 2010 | 172.8 | 60 % | 103.7 | 34.6 |
| 2009 | 144.1 | 40 % | 57.6 | 28.8 |
| 2008 | 170.3 | 20 % | 34.1 | 34.1 |
| 2007 | 156.9 | 0 % | 0.0 | 31.4 |
| Value R&D asset | | | 544.3 | |
| Total amor. This year | | | | 164.8 |

## 16.4 Altman Z-score Envipco

| Envipco. Currency: 1000€ | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| BV Debt | 13358.0 | 9873.0 | 15126.0 | 17264.0 | 14425.0 |
| BV Equity | - | - | - | - | - |
| MV Equity | 7982.2 | 6140.2 | 8634.6 | 37762.1 | 37416.7 |
| Current assets | 12707.0 | 14348.0 | 17139.0 | 19181.0 | 18509.0 |
| Current liabilities | 7911.0 | 6618.0 | 9934.0 | 11823.0 | 10066.0 |
| Working capital | 4796.0 | 7730.0 | 7205.0 | 7358.0 | 8443.0 |
| Normal total assets | 23385.0 | 24878.0 | 32743.0 | 40745.0 | 35050.0 |
| R&D asset | 2111.2 | 1964.0 | 1851.0 | 2336.4 | 3100.0 |
| Debt value of leases | 556.6 | 680.0 | 366.1 | 473.0 | 686.6 |
| Adj. BV debt | 13914.6 | 10553.0 | 15492.1 | 17737.0 | 15111.6 |
| Adj. assets | 26052.8 | 27522.0 | 34960.1 | 43554.4 | 38836.6 |
| | | | | | |
| Sales | 23145.0 | 21792.0 | 29635.0 | 33114.0 | 34049.0 |
| Normal operating profit/EBIT | -274.0 | -1402.0 | 1254.0 | 1376.0 | 830.0 |
| Added from caitalized R&D | -374.4 | -147.2 | -113.0 | 485.4 | 763.0 |
| Added from capitalized OL | 13.9 | 17.0 | 9.2 | 11.8 | 17.2 |
| Normal EBIT from measurement errors | -634.5 | -1532.2 | 1150.2 | 1873.2 | 1610.2 |
| Retained earnings | -47779.0 | -43154.0 | -41739.0 | -36618.0 | -39157.0 |
| | | | | | |
| | 2013 | 2014 | 2015 | 2016 | 2017 |
| X1 | 0.18 | 0.28 | 0.21 | 0.17 | 0.22 |
| X2 | -1.83 | -1.57 | -1.19 | -0.84 | -1.01 |
| X3 | -0.01 | -0.05 | 0.04 | 0.03 | 0.02 |
| X4 | 0.57 | 0.58 | 0.56 | 2.13 | 2.48 |
| X5 | 0.89 | 0.79 | 0.85 | 0.76 | 0.88 |
| Z | -1.15 | -0.89 | -0.12 | 1.17 | 1.28 |

## 16.5 Altman Z-score Buhler Sortex

| Buhler Sortex Currency: mCHF | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|
| BV Debt | 1318.7 | 1386.7 | 1377.9 | 1439.5 | 1906.7 |
| BV Equity | 1062.6 | 1145.8 | 1154.8 | 1276.5 | 1549.8 |
| MV Equity | - | - | - | - | - |
| Current assets | 1549 | 1665.5 | 1668 | 1853.9 | 2468.4 |
| Current liabilities | 968.1 | 1016.5 | 970.1 | 1057.5 | 1163.8 |
| Working capital | 580.9 | 649 | 697.9 | 796.4 | 1304.6 |
| Total assets | 2381.3 | 2532.5 | 2532.7 | 2716 | 3456.5 |
| R&D asset | 292.18 | 299.34 | 305.96 | 313.96 | 328.52 |
| Debt value of leases | 22.49 | 27.55 | 21.53 | 20.74 | 27.68 |
| Adj. BV equity | 1354.78 | 1445.14 | 1460.76 | 1590.46 | 1878.32 |
| Adj. BV debt | 1341.19 | 1414.25 | 1399.43 | 1460.24 | 1934.38 |
| Adj. assets | 2695.97 | 2859.39 | 2860.19 | 3050.7 | 3812.7 |
| | | | | | |
| Sales | 2321.8 | 2332.2 | 2412.3 | 2448.6 | 2671.7 |
| Normal operating profit/EBIT | 139.5 | 143.5 | 172.4 | 169 | 202.8 |
| Added from R&D | 22.84 | 7.16 | 6.62 | 8 | 14.56 |
| Added from OL | 0.56 | 0.67 | 0.54 | 0.52 | 0.69 |
| Normal EBIT from measurement errors | 163.01 | 151.2 | 179.54 | 177.69 | 217.36 |
| Retained earnings | 986.3 | 1051.1 | 1121.7 | 1048.2 | 1321.2 |
| | | | | | |
| | 2013 | 2014 | 2015 | 2016 | 2017 |
| X1 | 0.22 | 0.23 | 0.24 | 0.26 | 0.34 |
| X2 | 0.37 | 0.37 | 0.39 | 0.34 | 0.35 |
| X3 | 0.05 | 0.05 | 0.06 | 0.06 | 0.05 |
| X4 | 0.79 | 0.81 | 0.83 | 0.87 | 0.80 |
| X5 | 0.86 | 0.82 | 0.84 | 0.80 | 0.70 |
| Z | 1.82 | 1.78 | 1.88 | 1.82 | 1.74 |