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PANDORA

Equity Valuation of Pandora A/S

Master Thesis

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Abstract

The purpose of this thesis is to challenge the stock price of Pandora A/S as of November 1st 2016, by estimating the fair value of the stock. This is done by using two different valuation methods wherein two different methods of calculating the continuing value has been used. This has resulted in four base results of the Pandora share. The value of a share was found within the range of [587.02;792.84]. In order to reach the final estimates, a strategic, financial and a quantitative industry analysis is conducted to get a better understanding of Pandora and the industry wherein Pandora operates. The two greatest threats/drivers identified in the strategic analysis was Pandora brand value and the future development of commodity prices. This knowledge was used to forecast the value drivers in the Residual Operating Income Model. Both valuation methods are based on the residual operating income model, but uses two different methods for the risk adjustment. Consequently, the two risk-adjustments is estimated and an estimation of the risk-free interest rate structure is done, as the risk-free interest rate has been used in both models, however in different ways. The Residual Operating Income (ReOI) model indicates a share price of 740.99 DKK and 792.84 DKK depending of the specification of the continuing value term. The General Equilibrium (GE) model for risk adjustments yields a price of 587.02 DKK and 602.22 DKK. To some degree, the models support the market value of 830.50 DKK, although the GE-based model indicates that the share is slightly overpriced. At the end, a sensitivity analysis is performed, to check the validity of the results, along with a multiple valuation. The sensitivity analysis showed that the ReOI valuation was particularly sensitive to the equity beta, however, this applies to all risk discounting valuation models. But as the estimation of this parameter for Pandora is highly influenced by length of the investigated time period, the analysis showed that the equity beta could be estimated in the range [1.02, 1.77]. Consequently, the validity of the ReOI results is very low and perhaps the fair value of Pandora is significantly higher, based on the forecasting (1.77 used). However, the GE valuations indicate an even lower value than ReOI models. Based on the estimated share prices for Pandora A/S and the sensitivity analysis; the market price of Pandora seems to a moderate degree to be supported by fundamentals.

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2 FOUNDATION OF RESEARCH

2.1 MOTIVATION

Following Pandora's IPO, the share has been highly debated, and has split analysts and investors, especially in the first few years after the IPO. The most debated topic is whether the company is a fad or not, because Pandora to some degree earns all its money from a single jewelry category, charms bracelets. However, after the introduction on the market, the Pandora stock has only gone up, although with some fluctuations. This rises suspicion that the stock price may overshoot fundamental value, in which case, it is likely that it will decrease over time. This IPO phenomenon is called long-term underperformance. This provides motivation for critically challenge the share price[1] of Pandora A/S at the observed day November 1st 2016[2] at close. One of the challenges of making a valuation of Pandora is that the company has had impressive growth and improved all key margins. The big question is whether they are able to continue this trend, and ultimately when and how value drivers converge into industry level. My chose of models in the valuation is based on this background.

2.2 PROBLEM STATEMENT

Based on the above, the problem statement of the thesis will be supported by several sub-questions that the paper will answer in the thesis. The problem statement for the thesis is:

What is the fair value of a Pandora A/S share as of November 1st 2016?

To answer the problem statement, the following sub-questions must be answered.

- Based on a strategic analysis - which factors seem to affect Pandora value creation in the future?

- Based on a financial statement analysis - which factors have and will drive Pandora's growth?

- Based on a quantitative industry analysis - how will Pandora value drivers converge over time?

- Based on several analyses - how will the future residual operating income be adjusted to the associated risks?

- Based on a sensitivity analysis - to which parameters are the valuations especially sensitive for?

2.3 THESIS DELIMITATIONS

The paper will estimate the price of a Pandora as of November 1st 2016, at the time the Copenhagen Stock Exchange closed. The report from Pandora Q3 of 2016 will also be used. The paper separates itself from all information after that date, and it will not be included in the paper. Furthermore, as mentioned before, the paper will not include primary data[3] and only include secondary data. The analysis is based on the last five years

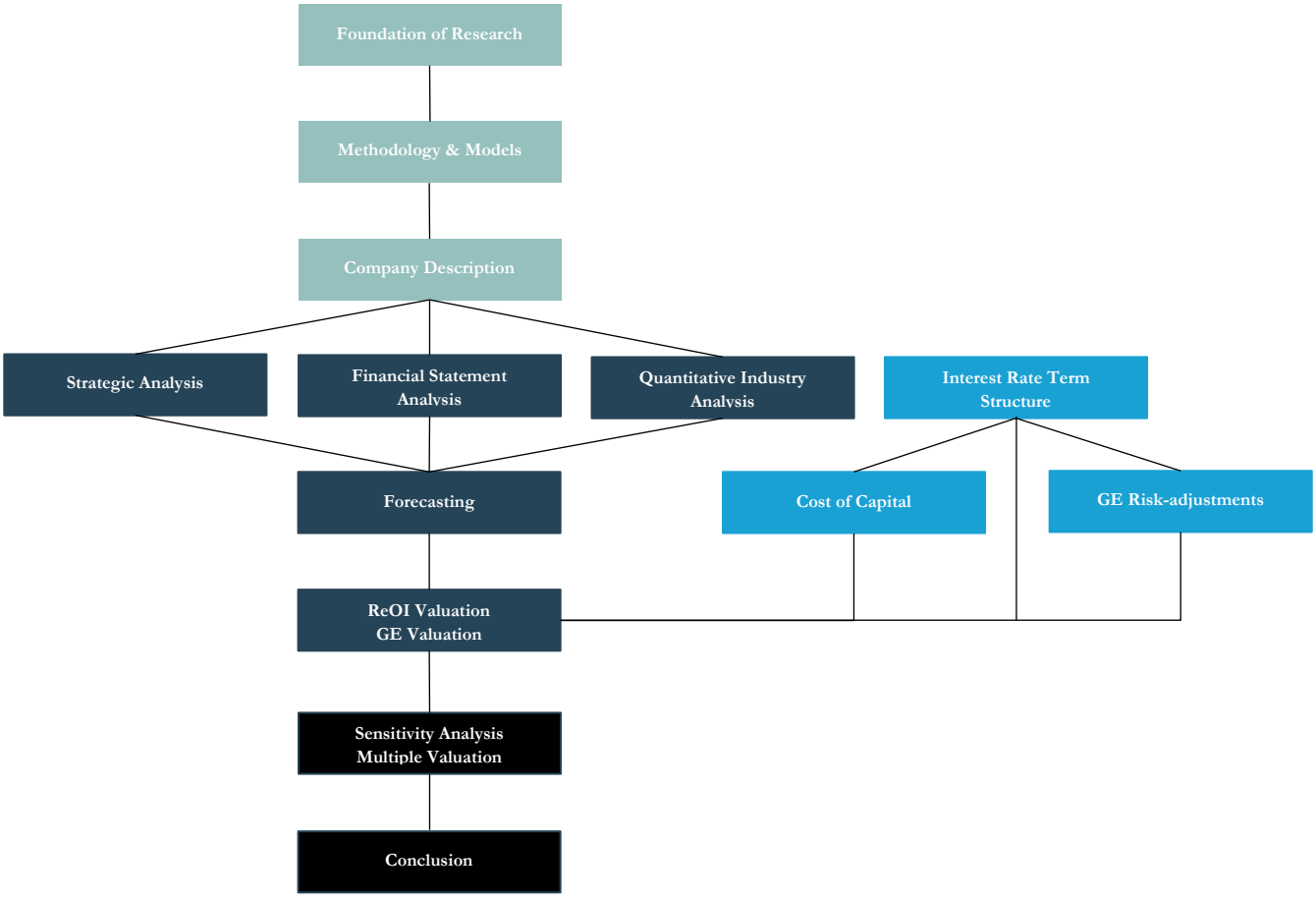
[1] 830,50 DKK
[2] Interim Rapport Q3 released in morning. The paper thus assumes that the market has had time to incorporate the new information. As the share price was fairly stable in the following days, this assumption is reasonable.
[3] Own collected data: interviews, observations and survey. (Andersen, 2016)

of annual reports, and will also budget period running until 2020. A liquidity analysis will not be made due to high liquidity and low debt. The paper will only use public available information although some sources requires user access, e.g. Bloomberg. Finally, the paper is written on the assumption that the reader has a basic knowledge within finance and business theory. Although a real option valuation method has been considered, it is not used in the paper.

2.4 STRUCTURE

Figure 1 – Thesis Structure shows an illustrative overview of the paper. The intent of the figure is to give the reader an overview of the paper and thus facilitate the reading process. The paper is structured in three main parts. Firstly, a foundation of research, an introduction to methodology and model used in the paper and a company description to introduce the reader to the company. Secondly, the backbone analysis is made to forecast the value driving activities and how the future residual operating income is adjusted to its associated risks. Finally, the paper will interpret the results and evaluate the analysis.

Figure 1 – Thesis Structure



Source: Own contribution.

2.5 SOURCE CRITICISM

As the paper is based solely on secondary data, it is necessary to critically evaluate the data collected. Therefore, the data will be evaluated on its validity and reliability, to create a solid database. Data obtained from Pandora published reports is assessed to be of high validity and reliability, whereas analysis from external research agencies are likely to be less reliable. Therefore, there is used more than one source of data, creating a more objective understanding.

3 METHODOLOGY AND MODELS

3.1 DATA COLLECTION

The primary information in the paper comes from annually and interim rapports from Pandora, Pandora's website, research reports and articles, market data. Market data comes primarily from Bloomberg, Bureau of Economic Analysis, central banks and DataStream. Industry rapports come primarily from investment banks and consultancies, such as Goldman Sachs, Carnegie, KPMG, AT Kearney and McKinsey etc. Journal articles used are primarily sources from acknowledged economic and accounting publishers including articles recommend by the supervisor.

3.2 STRATEGIC ANALYSIS

The main purpose of the strategic analysis is to investigate which non-financial drivers influence Pandora's operations, both historically and looking forward. The strategic analysis is done from three perspectives, external, industry and internal. The external analysis is conducted using the PESTEL model, which divides the external factors into; political, economic, social, technological, environmental and legal factors. It is important to keep in mind that the scope of the paper is not to conduct a historical review of Pandora, but finding the value of the company. The industry analysis uses the inevitable Porter Five Forces framework, which classifies industry profitability into five sources. The framework is build up by three horizontal sources; threat of new entrant, industry rivalry and threat of substitutes. The vertical forces are bargaining power of suppliers and buyers, respectively. Since Pandora is in many ways a success story, an internal analysis of the company is found important. This is analyzed with another Porter framework, Porter's Generic Value Chain. The framework divides the business into primary and supported activities. The purpose analyzing these activities is to find if Pandora can maintain a competitive advantage. This knowledge, as in the other two strategic analyses, provides a necessary backbone of information for the forecasting.

3.3 FINANCIAL STATEMENT ANALYSIS

The financial statement analysis is made in order to analyze the core profitability of Pandora. This is done by separating the operating and financing activities in the statements. Further it is required for both valuation models that there is a so-called clean surplus relation. This will not be further described in this section. With this done, a profitability analysis will be done with respect to the common shareholders.

3.4 QUANTITATIVE INDUSTRY ANALYSIS

The theory arises from an idea that the supernormal profit can only be sustained for limited periods of time. Industries with higher profitable industries will be attractive for new competitors, which flows to, until the normal profit is eliminated. Companies with below normal profit will either improve, close or be acquired. These factors contributed to the profitability of the companies in an industry will gradually move towards a common level, which will propagate in the underlying financial value drivers. This analysis is made to estimate the industry level for the value drivers of the ReOI model. This is done in two ways, a visual analysis in order get a visual overview of the "average" development in value drivers in the industry. Hereby, a time series analysis

is made to quantify the value drivers long-term level and persistence, which will be used after the explicit forecast.

3.5 TERM STRUCTURE OF INTEREST RATES

The model used for the estimation is the Extended Nelson-Siegel Model. The model used to derive the term structure of risk-free interest rates. The risk-free interest rate is a critical parameter in the discount rate, so the paper finds it important, not to assume a constant risk-free rate. Further, the current short-term risk-free interest rate is at a historical low level that it will be a weakness for the paper to assume this into infinity, which the valuation models assumes. When the term-structure has stabilized the valuations, where Gordon Growth formula is used for, the continuing value can be done, as the formula assumes a constant risk free rate.

3.6 VALUATION MODELS

This section will introduce the valuation models used in the paper to determine the price of Pandora. First, an introduction to The Residual Operating Income (ReOI) model will be done, after which an explanation of the methods used for the risk-adjustments. The ReOI model introduction will be rather short, as the model is considered rather standard. The two methods used in the paper is the ReOI model and the other is the consumption based General Equilibrium (GE) model proposed by Christensen and Feltham (2009). While there are several more methods for estimating the value of a company, the paper will only focus on these two methods.

3.6.1 The Residual Operating Income Model

The Residual Operating Income Model can be stated as the following (Penman, 2013)

$$V_t = NOA_t + \sum_{\tau=t+1}^{\infty} {\rho_F}^{-(\tau-t)} E_t[ReOI_\tau]$$

where the residual operating income (ReOI) is defined as

$$ReOI_\tau = OI - (\rho_F - 1) * NOA_{\tau-1}$$

where ρ_F is the firm cost of capital, NOA is net operating assets and OI is operating income. If we define the following; the profit margin, $PM_\tau = \frac{OI_\tau}{Sales_\tau}$, the asset turnover, $ATO_\tau = \frac{Sales_\tau}{NOA_{\tau-1}}$ and revenue, $Sales_\tau$, the ReOI model can be rewritten as the following

$$ReOI_\tau = Sales_\tau[PM_\tau - (\rho_F - 1)\frac{1}{ATO_\tau}]$$

This formulation of the model is great, as its highlights the key value drivers for the ReOI model. These value drivers will be investigated in the financial statement analysis and in the quantitative industry analysis.

3.6.2 The General Equilibrium Model

In this section the General Equilibrium model is introduced. In the article "*Equity Valuation*" (Christensen & Feltham, 2009) it is showed that a risk-adjusted firm cost of capital approach is only valid in a single-period setting. When using this approach in a multi period setting, several problems arises. The main problem with the ReOI model is that it does not acknowledge stochastic behavior of one-period ahead returns. The GE model doesn't suffer from this problem. The GE model secures a link between the time series properties and the underlying accounting figures and the risk-adjustment. This implies that the GE model doesn't require a constant capital structure, and can be used in a multi-period framework. As the GE model isn't considered a standard model, a theoretical section of the model is done, so the reader will get a deeper insight into the model and its assumptions.

Similarly, to the ReOI model, the GE model relies on a clean surplus relation, where the operating and finance activities is separated. The model also relies on the financial asset relation, operating asset relation and the marked-to-market relation (Christensen & Feltham, 2009). The financial assets will as in the ReOI model not generate any futures residual income. The GE model can be expressed as the following

$$\frac{V_t}{NOA_t} = 1 + \sum_{\tau=1}^{\infty} NOA\left[E_t\left(RIR_{t,t+\tau}\right) - Cov_t\left(RIR_{t,t+\tau}, ci_{t+\tau}\right)\right]$$

where $RIR_{t,t+\tau} = \frac{ReOI_{t+\tau}}{NOA}$ and ci_τ is consumption index. From the expression, we can see there is a closed-form expression for the risk adjustment (last part). The future residual income returns are therefore in the GE model *adjusted* in numerator and the risk-*adjusted* forecasted returns are then discounted by zero-coupon interest rates. The structure of the risk-free interest rate is found in the term structure of interest rate section. In the practical implementation and the estimation of risk-adjustments, the model will be described in a much higher level of detail. (Section 11)

4 COMPANY DESCRIPTION

Pandora is one of the largest jewelry companies measured in retail value. Pandora is positioned within the "affordable luxury" segment, where the company offers jewelry in the categories: charms and charms-bracelets, rings and earrings for females, which is sold in more than 10,000 sales points worldwide. Approx. 1,300 of these sales points are concept stores, which only sells Pandora products. As today approx. 30% of the concept stores are owned by Pandora; the rest are franchise stores. Pandora production takes place in Thailand, where the production method is predominantly manual, which has made Pandora the largest employer in the Thai jewelry industry, with around 12,000 employees in PPT[4]. The manual production makes Pandora asset light, as expanding production requires very limited capex spending. Pandora's revenue by geography can be found in Appendix A.

4.1 THE HISTORY OF PANDORA A/S

Although Pandora is seen by many as a relatively new player in the jewelry industry, the company was founded back in 1982 by the Danish goldsmith Per Enevoldsen and his wife Winne Enevoldsen. The original company's business plan involved importing jewelry from Thailand. As the years went on the company began to focus on wholesale in Denmark. In 1987 Pandora stopped the wholesale. Pandora as an import company was over; the company now wanted to design and manufacture their own jewelry. The jewelry should be designed in Denmark and manufactured in Thailand using manual labor, which is the same business model as today. Pandora chose only to produce jewelry targeted females, and this principle has been sustained. The big breakthrough came in 2000 when they launched their charms bracelet assortment in the Danish market. Pandora moved into bigger headquarters and the first designer was hired for the Company. The company expanded rapidly, and began penetrating new key markets; USA in 2003 and Germany and Australia in 2004. Consequently, Pandora could not keep up with demand and invested in a new built 6 story production facility in Bangkok. This is still as today a major asset in Pandora's production capacity, although it has been built to new production facilities since, in the same geographical area close to Bangkok, Thailand. The Danish private equity fund Axcel acquired in 2008 60% of the shares in Pandora, after which they chose to let Pandora go public at the Copenhagen Stock Exchange in 2010. Axcel chose (wisely) not to sell all shares close after IPO, but sold their shares on an ongoing basis, with final exit in 2014 (uk.axcel.dk, 2016).

4.2 RETAIL MODEL

Pandora's sales channels can be divided into: Branded Sales (Retail) and Non-Branded sales (Wholesale). Pandora finds the branded retail format consist of concept stores, shop-in-shops and gold dealers. Following is a brief description of the retail formats.

- Concept Store
  A concept store is a full-blown Pandora store, which only sells the company's products. Concept stores carries the full assortment, and is designed with a Pandora store front and interior.

[4] Pandora Production Thailand or formally PANDORA Production Co., Ltd.

- Shop in Shop
  A shop-in-shop is a clearly defined space in a store or department store dedicated to Pandora. Shop-in shops carries a wide assortment of Pandora products, but not the full assortment as the concept stores. Besides from that the shop is very similar to a concept store, but smaller and often with no branded store front.
- Gold Dealer
  Gold dealers is multi-brand retailers, with has, what Pandora considers, a strong Pandora profile. Gold dealers have in comparison to silver and white retailers Pandora fillings in the shop, which makes them a branded sales channel according to Pandora, although the retailer shop carries a multi-brand assortment.
- Silver and white shops
  Silver and Silver shops are also multi-branded retailers, where silver shops carry a medium assortment, and white carries a very limited assortment. There is no strong Pandora branding in either of the categories.

4.3 THE FOUR STRATEGIC PILLARS

The thesis finds it relevant to briefly describe Pandora's four main strategic goals (pillars). These are essentially to comprehend to understand Pandora's mission[5] and vision[6]. In addition, the paper will make references from the strategic analysis to the four strategic pillars, as they will be relevant to see how Pandora try to operate in the industry.

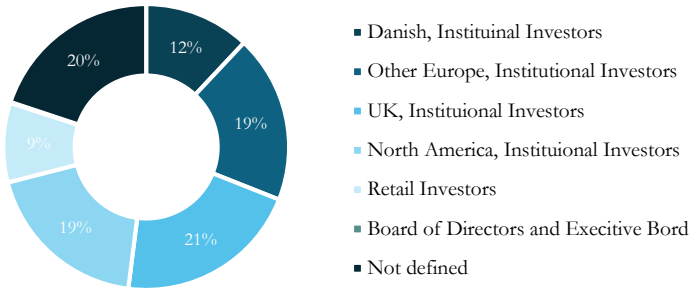
The seven annual launches are: Valentine's Day, Spring, Mother's day, High Summer, Pre-Autumn, Autumn and Christmas. Christmas sales and therefore Q4 is by far the most profitable quarter since it usually, contributes 50% higher revenue than Q3.

4.4 OWNERSHIP AND SHARE INFORMATION

No shareholders have currently a stake of more than 5% of the share capital as of 1 November 2016. Figure 2 shows the distribution of institutional and retail investors sorted on geography when information is given.

[5] Mission - "Our mission is to celebrate women by offering them the opportunity for personal expression through our universe of high-quality and contemporary jewelry at affordable prices"
[6] Vision - "Our vision is to become the world's most loved jewelry brand"

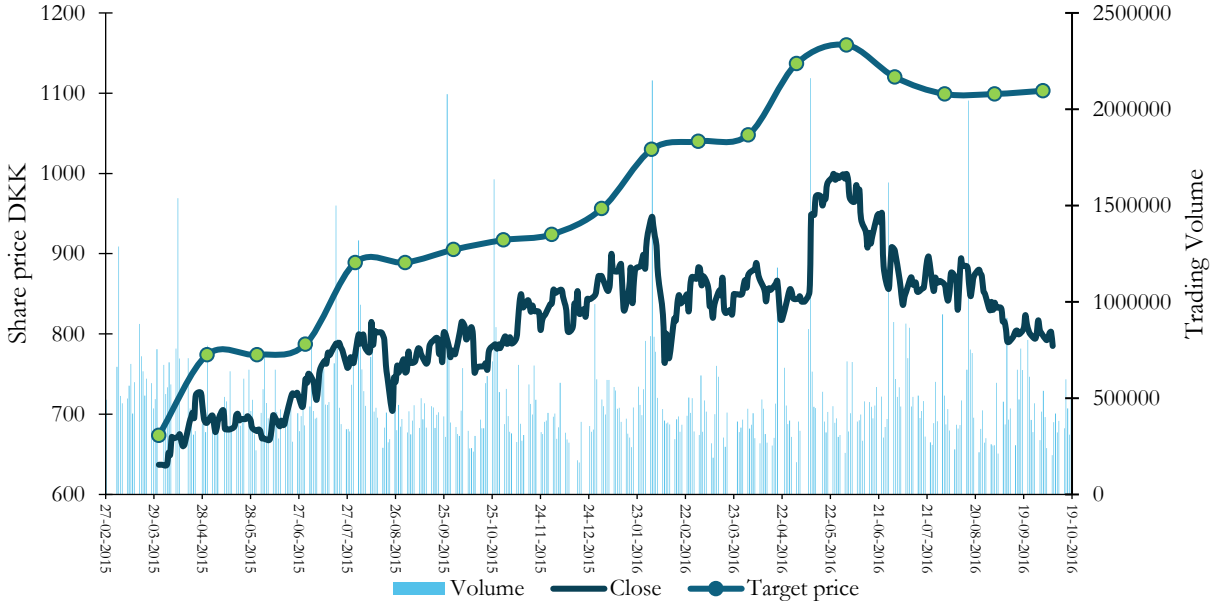
Figure 2 – Shareholder Distribution as of 31. December 2015



Source: Pandora 2015 Annual Rapport

Figure 3 shows the share price the recent year, and the average target price from 11 analysts. The graph indicates that it is generally a positive view on Pandora, why it is important that the paper chooses a healthy critical look at investment banking reports.

Figure 3 – Average Target Price vs. Price and Trading Volume



Source: Bloomberg and Finance Yahoo

5 STRATEGIC ANALYSIS

The purpose of the strategic analysis is to identify the non-financial value-drivers affecting Pandora's operation and thus future earnings. The analysis is done from both an external and an internal perspective. The external perspective focuses on the macroeconomic factors and the industry environment where Pandora operates. The internal perspective analyses Pandora's value chain, where the focus is on the company's resources and capabilities. Each section will be provided with a sub conclusion that summarizes which factors that either boost or constraint Pandora's value creation.

5.1 MACRO ANALYSIS

In the following section the paper will identify and analyze the macroeconomic parameters that affect Pandora's operation and thus future earnings. The analysis of the macroeconomic environment is done using the PESTLE framework. The paper uses a shortened version where Political and Legal factors are analyzed in a combined setting. Macroeconomic exposure is changes in market variables which are consistent for all firms. This section will therefore deal with exchange rates; commodity prices etc. as companies do not have a direct influence in these variables.

5.1.1 Political and Legal Factors

Pandora operates in more than 90 countries, so the paper will investigate the more established markets (and future), for how the political and legal environment can affect Pandora's future earnings. As Pandora produce relatively harmless products (not tobacco, drugs etc.), this section will focus at the development in relation to the production (ethics, wage development etc.), trade agreements, taxes and duties, as well as conditions concerning patents and trademarks.

5.1.1.1 Taxation and Trade Agreements

Pandora has its headquarters in Denmark and is therefore operating under the Danish tax regulations. Because of the political agreement "Vækst Plan DK" adopted in 2013, the corporate tax rate has been declining thereafter (Regeringen, 2013). The last downward adjustment is in 2016, where the nominal corporate tax rate will be 22% and forward[7]. Corporate finance theory can explain that this provides better liquidity for Pandora, and has more free cash to either pay to shareholder or reinvest in operations.

Pandora has from the end of 2015 agreed to an extension of their tax exemption in Thailand resulting in an extension until ultimo 2024 (Dagbladet Børsen, 2016). The tax exemption constitutes besides corporation tax on Pandora Production Co. Ltd. but also dividend tax to the company's owners (Pandora A/S). Additionally, there will be an exemption from import duties on certain machines and raw materials.

In 2007 China and Europe initiated a trade agreement between the two parties. A finalization of these negotiations could benefit Pandora (EurActiv Network, 2016). A potential affect from an agreement could potentially benefit with lower tax on imported goods, which will make Pandora's products more competitive

[7] Or until it becomes politically decided to amend the adopted corporate tax plan.

in China. If either of the governments choose as protectionist strategy, it could resolve in additional trade barriers which eventually could hamper Pandora's growth opportunities in China.

5.1.1.2 Production in Thailand

Pandora's entire production is in Thailand, with a work force with approximately 12,000 employees (Production: Thailand, 2016). Thus, Pandora is affected by the political environment in the country. With a high manual labor force and an asset light production, the wage development is important to determine, to determine Pandora's future earnings. The "Wages in Manufacturing" is determined to have a CAGR of 1.8 percentage until 2020 (Thailand Wages, 2016).

5.1.1.3 Patents and Trademarks

Pandora has several patents on their products. The most critical patent is the one named "Necklaces and bracelets with keepers"[8] , which serves the purpose that it is possible to distribute even a few charms around the entire the bracelet, so does not to pile up on the bottom when carrying it (Espacenet, 2013). Pandora has this patent in 30+ countries, many EU countries, United States, Australia and China. The patent matures in 2023 in the United States, and in 2024 in the remaining countries. (Pandora A/S - Annual rapport, 2015). Based on the following, the paper does not find this expiration of the patent a threat for Pandora. Firstly, because of the long patent maturity, and secondly because many of Pandora's competitors has developed a solution for the same purpose, why it seems unrealistic that Pandora's customers will change to other brands if they start using the same "stop" technology / design in their bracelet. Since they already have a working alternative. Regarding Pandora's trademark situation there is no threats identified. Pandora's trademarks are the name and logo.

5.1.2 Economic Factors

Analyzing the economic factors for a consumer discretionary firm like Pandora, the paper finds the state of the economy the upmost important. Consequently, the thesis will focus on the economic factors from a discretionary income perspective. From this knowledge the thesis will focus on, economic growth and consumption, currency and interest risk, and finally but not least important the price of commodity prices which are essential input's for Pandora's jewelry production.

5.1.2.1 Economic growth and Consumption

Pandora's business cycle seems to be within the year. From the Financial Statement Analysis, the thesis has found that on average approximately 50% of the revenue contribution is obtained in Q4. The global jewelry market measured on revenue, shows that Asia Pacific has a 50% share, United States 25%, Europe 16% and the remaining part of the world has 9% share. The expected growth rates in these markets is highlighted in Table 1. One could argue that the paper should use GDP forecasts here, but the paper finds industry forecasts much more useful, although it may conflict with the framework.

[8] Bibliographic data: CY1107955 (T1) — 2013-09-04 (European Patent Office)

Table 1 – Forecasted Jewelry Revenue Growth by Region

Region	2016e	2017e	2018e	2019e	2020e
Asia Pacific	9.10%	8.50%	9.50%	9.2%	9.10%
Americas	5.25%	5.45%	4.90%	4.65%	4.50%
Europe	4.10%	3.70%	3.90%	3.90%	3.80%

Source: Market Line – Global Jewelry & Watches 2015

Table 1 shows the forecasted growth in the major regions is expected to increase steadily and the growth is mainly driven by the Asia pacific market. With a current market share of 50 %, it is not difficult to understand that Pandora planned penetration strategy in the Asia Pacific region. This particularly penetration will be investigated in the industry analysis and in the forecasting section.

5.1.2.2 Commodity Prices

Pandora states that approx. 5% of their cost of goods sold comes from wage cost in Thailand, and more than 90% comes from raw material such as silver, gold, precious and non-precious stones, where silver is the most predominantly commodity followed by gold. Consequently, understanding the impact from changes in commodity prices is key to forecast Pandora's forward profitability. Secondly the thesis finds it important to understand how Pandora reacts on changes in raw material prices. In 2011 Pandora changed prices due to a significant change in commodity prices, which struck hard on their sales (and traded share price). Subsequently Pandora admitted that their strategy, transferring the extra cost towards the customers, was a failed strategy. Since then, Pandora has not changed their pricing in relation to commodity prices, although there have been fluctuations in commodity prices. The way they do this is by hedging their commodity prices ahead, by the use of a rolling hedge strategy and by the use of financial instruments (mainly futures). Based on a rolling 12-month production plan, the policy is for Group Treasury to hedge approximately 100%, 80%, 60% and 40% of the risk for the following 1-3 months, 4-6 months, 7-9 months and 10-12 months respectively. Consequently, futures as a hedging instrument, that ensures the short-term price, but long-term future prices will increase proportionally with commodity prices. It is therefore important to understand that Pandora is hedged short-term, but are not hedged in the long term, given their one year rolling hedge strategy. This indicates a clear threat for Pandora's as their customers indeed can be characterized as price sensitive.

5.1.2.3 Currency and Interest Rate Risk

Pandora's presentation currency is Danish kroner (DKK), but most of Pandora's activities and investments are in foreign currencies. Most of Pandora's revenue is denominated in USD, CAD, AUD, GBP and EUR (Pandora, 2015). Consequently, Pandora heavily dependents on the relationship between the Danish krone and the foreign currency. Pandora is highly exposed to the USD as Pandora's commodity purchases are made in USD. Foreign exchange losses will reduce turnover and thereby squeeze profit margins. Same as with commodity prices, Pandora also hedge currency risks in the same way to hedge 100% of exposure 1-3 months and so on. Pandora is partly hedged against the US dollar as commodity prices traded in that currency. Pandora will net be better off, if the dollar will strengthen against the Danish krone and vice versa (Pandora annual report, 2015).

Historically, Pandora has operated with a low net interest bearing debt (NIBD). Effecting, that the short-term interest rate risk for Pandora is very limited. Forward looking Pandora target to have a NIBD/EBITDA ratio interval in the interval [0;1]. The historical net interest bearing debt development can be seen in section 10.1. In this section, it will be clarified that Pandora will take up more debt looking forward, why Pandora in the future will be more exposed to interest rate risk.

5.1.3 Socio-cultural Factors

The socio-cultural factors will in this paper focus on how fashion trends manages to affect Pandora's value creation. As mentioned in the Company Description, charms and charms bracelets contributes to 80% of the revenue generation. Although Pandora focuses (and partly succeed) to generate higher relative revenue other parts of their product range. Pandora will nonetheless, be very hard affected if charms bracelet goes out of style.

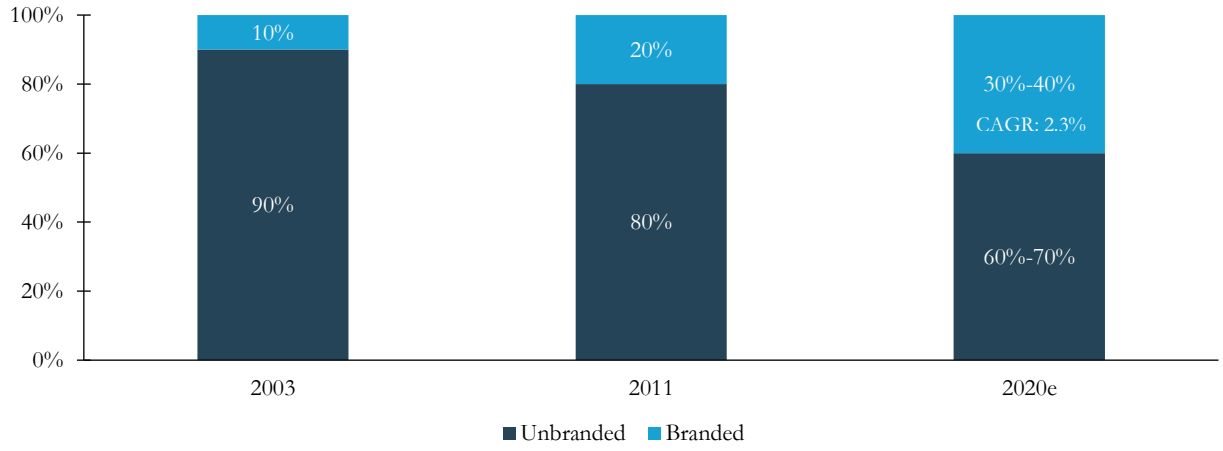
5.1.3.1 Change in Consumer Behavior

According to Pandora, their products can be characterized as "affordable luxury". Thus, the product is therefore mainly attractive to the middle-class, but also to a lesser extent the upper class. Pandora is therefore different from their competitors, as they cannot be characterized as "affordable". This is very easily observed by comparing prices of Pandora products with competitors such as Tiffany's & Co. and Cartier. But there is also another important distinction one should make; between branded and unbranded jewelry. Especially when understanding the development and, in particular, the forward development of the jewelry industry. According to (McKinsey & Company, 2013) there are three factors that will drive the share of branded jewelry market in the whole jewelry market:

1. New Money Consumers, who uses branded jewelry to demonstrate their newly gained wealth.
2. Emerging Market Consumers, for whom branded jewelry demonstrate an upgraded lifestyle and inspire at trust of sense.
3. Young Consumers, who prefer branded products to embrace their self-expression and self-realization.

As a consequence, Figure 4 shows that the branded jewelry market could double its share within the jewelry industry by 2020, with an implied CAGR of 2.3%. By contrast, branded watches hold 60 % of the total watch marked (McKinsey & Company, 2013).

Figure 4 – Development of Branded and Unbranded Jewelry



Source: (McKinsey & Company, 2013), and own contribution.

5.1.4 Technological Factors

Pandora is as earlier mentioned an asset light firm, where the jewelry is crafted by hand. Furthermore, 4% of Pandora's revenue is generated though e-commerce.

5.1.4.1 Production

From a production perspective Pandora doesn't have to change a lot of its production equipment as new technology arises. On the other hand, could new technology such as 3D-printer challenge the manual jewelry production. With a monthly manufacturing salary of $500 this does not seem realistic within next coming years. With an average wage increase in Thailand on 1.8% until 2020, and the fact that a lot of people who buy Pandora products relies in the hand-crafted products. This does not seem to be a realistic threat. The paper has not found any articles suggesting this a possible threat. A video from Pandora on YouTube, illustrates the complex and sophisticated making of a charm, whereby the assumption seems to be confirmed (Ben Bridge Jeweler: The Making of PANDORA Charm Jewelry, 2014)[9].

5.1.4.2 E-commerce

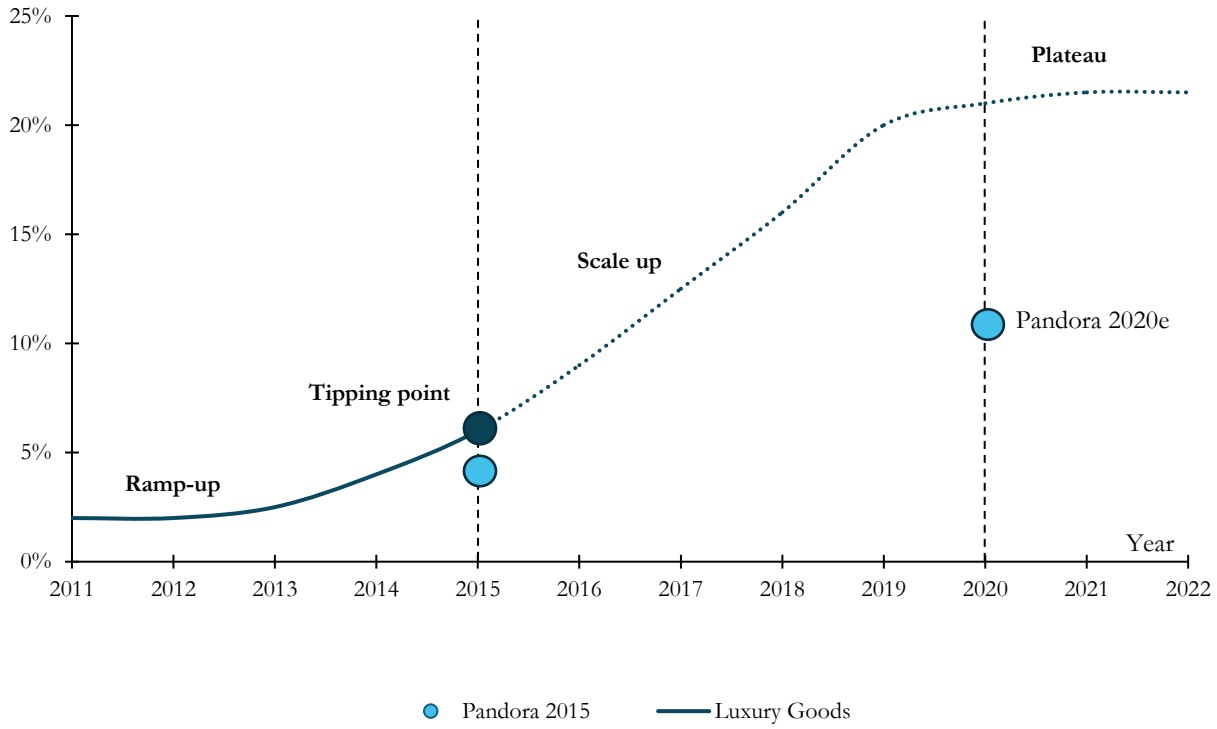
With the rise in the e-commerce the paper finds several boosts and constraints for value creation (A.T. Kearney, 2015). On the constraint side, consumers can in an internet based market place more efficient compare prices across different products, and thus make more thoughtful purchase decisions. This could potentially make consumers more price sensitive, as they have a better overview of prices from various jewelry manufacturers. This potential risk is consistent with Pandora's price strategy. Pandora has since 2011 been very "religious" concerning not changing prices due to changes in commodity prices. Another important strategic action is to constantly improve the Pandora brand, as it predominantly is the reason why the customer chooses their product by the end of the day. According to (McKinsey & Company, 2015) could e-commerce triple its market value in the luxury good segment, which is illustrated in Figure 5. Another report suggests that e-commerce in

[9] Direct link: https://www.youtube.com/watch?v=rRxD9nxyb1I

the jewelry market will maximize at 10-15% because of the nature of the product. Jewelry is highly evaluated/purchased from its "finish" and "level of detail" which is difficult to assess from pictures. Consequently, physical commerce will still be the most common way to purchase jewelry, and therefore be a constraint for rise of e-commerce usage (McKinsey & Company, 2013). Other impacts of the rise of e-commerce such as easier-market entry of competitors will be addressed in the Industry Analysis.

The following figure shows the estimated development predicted by McKinsey & Co. where e-commerce for luxury goods is shown. However, e-commerce for branded jewelry will find is level between 10-15%, thus the paper forecast this for Pandora.

Figure 5 – Development of E-commerce as % of Total Brand Value



Source: Altagamma-McKinsey Digital Luxury Experience Observatory, July 2015, own contribution.

5.1.5 Environmental Factors

Increasing awareness on environmental issues will affect most industries (Goldman Sachs, 2015) in the future. This trend could affect Pandora both positive and negatively. If Pandora is forced to fit a CO2 quote it could harm the production costs. Pandora is aware of this potential threat and contributes resources into recycling of water, LED lighting in stores, and energy optimization in the manufacturing. As the production is mainly done from manual labor force and a low production asset base, it seems unrealistic to be a threat. Since jewelry is a small item thing, increasing transportation costs etc., it seems unlikely. Consequently, this will not reflect an increasing environmental trend.

5.1.6 Recap on Macro Analysis

The main findings in the macro analysis refers to economic factors, socio-cultural trends and technology. As 90% of Pandora's cost of goods sold comes from commodities, the future development of primarily silver prices but also gold, is vital in Pandora's future profitability. The analysis finds that Pandora's costumers are highly price sensitive. This was investigated by the event in 2011 where Pandora tried to transfer the increasing commodity costs to their consumers, by increasing the prices. This strategy was a big failure, as Pandora realized very disappointing sales figures. Following, Pandora downgraded their sales expectations, which caused a drop in the share price of 60%. This implies that Pandora is particularly exposed to commodity risk.

The jewelry consumers are starting to become more brand conscious. This can to some degree explain Pandora's historical success, why a weakening in the branded jewelry market will affect Pandora negatively. However, several consultants' reports states a positive development in the branded jewelry market will continue and could double by 2020. This provides motivation for focusing on Pandora's branding in the further strategic analysis. Finally, has e-commerce found to be an important factor in the technological section. As Pandora's customers have shown great sign of price sensitivity, it is a threat that customers increasingly will use an internet based market place, where they are able to compare prices across different products.

5.2 Industry Analysis

In the previous section the paper analyzed the macroeconomic factors impact on Pandora. In this section the thesis will investigate the industry environment surrounding Pandora and how Pandora's strategy fits the development of the industry. The analysis will be made using the Porter's Five Forces framework (Porter, 2008). As described in the company description Pandora operates in the jewelry industry. The thesis will use this analysis to gain knowledge in the attractiveness and profitability in the industry, by identifying the five forces that Porter describes as the forces that shape strategy. This insight will provide information to the explicit forecast, and therefore special, just as in macro analysis will focus on the ongoing development of the industry. Since Pandora differentiate itself in terms of price quite significantly from their main competitors, it is important to define the industry on which the analysis will be based on. It is to be found in this analysis is whether Pandora can have a continuous competitive advantage.

Figure 6 – Porter's Five Forces

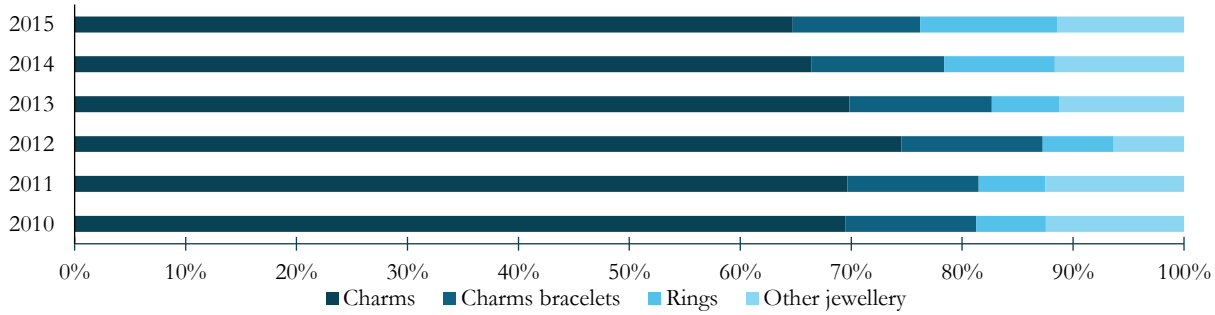
Source: (Porter, 2008) and own contribution

5.2.1 Defining the Industry

5.2.1.1 Product Aspect

Pandora's produces and sells different styles of jewelry in the categories as charms, bracelets, rings and earrings. The company has also tried to sell watches, but this project was shut down because it didn't meet the company's expectations (Berlingske Business, 2016). If we look at Figure 7 it is clear, that charms and charms-bracelets contributes to a high degree of topline with approximately 80% of the sales. Consequently, the analysis will when possible, deal with this product category when possible. As mentioned in the company description, (section 4.3) Pandora is seeking to generate more sales in its other product categories, thus, in the medium and especially the long term, it is also important to treat the jewelry industry from the traditional categories such as rings. Consequently, the analysis on the product side treats the entire jewelry industry, with special focus on charms and charms bracelets.

Figure 7 – Revenue by Product Category



Source: Pandora annual rapports and own contribution.

5.2.1.2 Price and Brand Aspect

On the price side, Pandora's sells its products to significantly lower prices than what the paper considers their main competitors. Where jewelry is typical considered a luxury good; Pandora, researchers and analyst calls affordable luxury. Researching different e-stores pages the paper finds that this is an important finding. If you must make a comparison to the clothing industry, one should perceive Pandora in the same segment as Zara and H&M, compared with brands like Levi's, Ralph Lauren and Hugo Boss for example (McKinsey & Company, 2013).

Porters Five Forces will therefore be applied to the "**affordable jewelry industry**", where branded company's and the development of charms bracelets within the industry will have a particularly focus.

5.2.1.3 The Industry at a glance

The fine jewelry market can in general be divided into three price segments. The affordable jewelry market, in which Pandora operates in is defined as jewelry with a price less than 1,500 USD. Whereas the luxury segment is for jewelry prices in the price gab between 1,500 and 10,000 USD. Finally, there is the high-end segment for jewelry with retail value more than 10,000 USD. As of 2009 the affordable jewelry segment accounted for 57% of the fine jewelry market which equals USD 83 billion. From 2000 to 2009 the charms bracelet jewelry market

has grown 6% annually (Our Industry, 2016)[10], which supports the argument that charms bracelets are not a fad. On the basis of the product's steady growth dating back to 2000, the paper argue that one should perceive charms bracelets as a jewelry category like rings, earrings, necklace etc. There will of course be fashion trends within these categories, which could hamper Pandora, but stating one of these categories could be fad is not justified. Paper therefore concludes that the risk of charms-bracelets is no longer present, although there will be fashion trends within charms-bracelets which could hamper Pandora

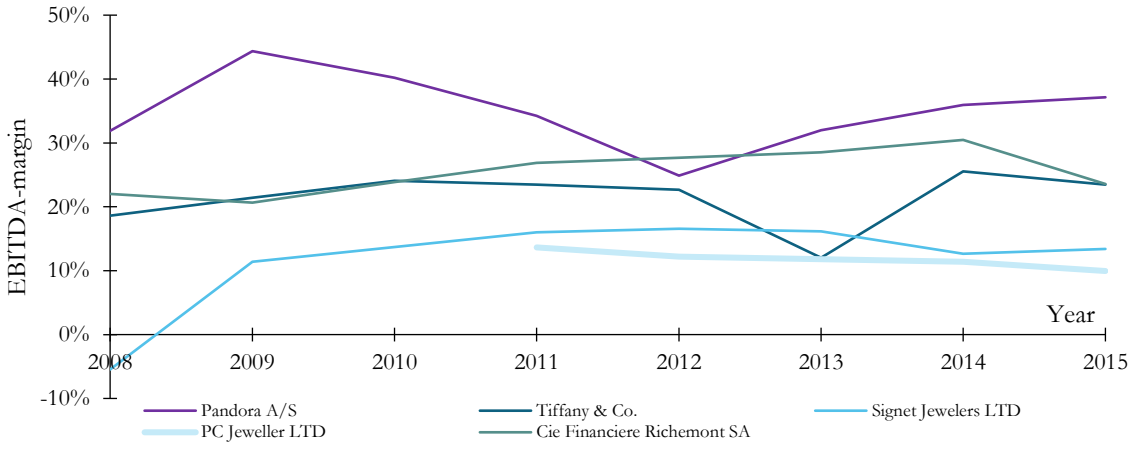
5.2.2 Threat of New Entrants

The threat of new entrants will generally increase in industries where there is a high margin and high demand (Porter, 2008). What often determines whether a market is changed by entry of new players, is how capital heavy it is to enter the market, and how important it is to have cooperation agreements and know-how.

5.2.2.1 Industry Attractiveness

If we use EBITDA as a measure for profitability, Figure 8 shows that that an EBITDA margin in the interval between 20%-30% is more the rule rather than the exception for Pandora and its main peers. This indicates that the industry historically has been a profitable industry to operate in. Furthermore, it indicates that branded jewelry and clothing firms, is capable of have a continues competitive advantage. The paper finds this historically profitability, a measure of brand value, rather than high entry costs. The profitability will seek attention towards the industry, although the paper finds that given the McKinsey analysis predicting that the share of branded retails will increase, it also caps the possibility for going in. In comparison to the clothing industry where branded products have had a huge share in the last centuries, one can say that being a brand puts a hamper on how many companies that can be, hence brand means sense familiarity and recognition. In the financial statement analysis (see page 51) found that Pandora historical has kept a fixed ratio between marketing costs and sales, thus it must be interpreted as Pandora takes their branding very seriously.

Figure 8 – EBITDA/Sales, Pandora and Peers



Source: Bloomberg L.P 2016

[10] Source: Third party independent research released by Pandora.

5.2.2.2 Access to Distribution Network

Entry barriers are strengthened if there are a limited number of retail channels, which already filled its existing players in the industry. There is then two ways to enter the market; be a part of an established sales channel or create your own. Pandora has mainly used established retail platforms (multi-branded jewelry retailers) as a sensor of customers demand their product in new geographical areas, and if it's great; Pandora will focus on opening branded sales channels through shop-in-shops and concept stores. E-commerce will challenge, the for now quit large entry barriers, since it is possible to create a sales channel cheaply. However, it's important to keep in mind that it will be difficult to create a brand, but with a change in the whole social media trend in society there are several studies which indicate that in the future it will be less capital heavy and more effective to advertise and thereby burst its brand through sites like Instagram, Snapchat and Facebook (Bain & Company, Inc., 2011). The paper has characterized the threat of new entrants as moderate to high.

5.2.2.3 Branded "Non-Jewelry" Players

Historically the growth in the branded jewelry came from increasing market share of established company's such as Tiffany & Co. and Cartier, and from new entrants such as Pandora. A possible scenario is that the future growth in branded jewelry will come (partly) from non-jewelry players, which strong brands such as Hermès, Louis Vuitton and Dior. These companies have been introducing jewelry collections or expanded their assortment. The major brands as here mentioned, will not be a mention threat for Pandora, as these companies will sell their products in a completely different price range.

The threat of new entrants is high, but it must be taken upholstery that it is not easy to enter the market. A recent example of this is the closure (on going) of "Endless Jewelry" which was a former big Pandora franchisee[11], with several large investors including the Lars Seier Christensen which is estimated to a loss of 100m DKK (not the only investor). Face of, the company seemed promising as know-how and venture capital was present, including Jennifer-Lopez as figurehead (Lars Seier står til kæmpetab: Smykke selskabet Endless på vej i konkurs, 2016). This does not reject the threat of new entrants, but shows that it is not easy to enter the market.

5.2.3 Threat of Substitutes or Services

The threat of substitutes is determined by the customer's substitution effect. It is important to keep in mind that the analysis concerns affordable jewelry and not jewelry in general, why jewelry as an investment object is not considered as realistic, and therefor investment alternatives such as real estate and stocks are not covered. To analyze the effect, one need to understand why these products is bought. Since 50% of Pandora's sales are generated in Q4. It is therefore reasonable to assume that a significant part of Pandora's products is bought as Christmas gifts or birthday gifts. A substitute of a jewelry gift could be lingerie or clothing items. Pandora uses their brand value to shield their products from substitutes. This is an important strategic action, as 80 % of their sales is generated from charms and bracelets, as earlier mentioned. Pandora therefore aims to increase their sales of particularly rings, which records the highest sales within the jewelry market (MarketLine, 2015). From this, the paper concludes that the threat from substitutes for the whole (affordable) jewelry industry seems insignificant. But if evaluating Pandora as Charms manufacturer, we see a significant threat. The threat

[11] Jesper "Kasi" Nielsen

is therefore greatest in the short run and will fade out as the Pandora have created additional sales in their rings, earrings and necklace line. The paper has characterized the threat of substitutes as moderate.

5.2.4 Bargaining Power of Buyers

Pandora sales channels can be divided into retail and wholesale. Consequently, this analysis will be divided into Business-to-Consumer and Business-to-Business bargaining power.

5.2.4.1 Bargaining Power of Customers

As mentioned earlier in the thesis, Pandora's customers have historically shown to be price sensitive. Consequently, Pandora strives to keep price "constant", and have not changed them because of more expensive commodity costs, which they have succeed with since 2011. There are low/no capital switch cost in the jewelry market. Costs must me understood more mental, for customers, who have bought a Pandora charm, and therefore must consider to improve their bracelet with additional charms, or purchase another company product.

5.2.4.2 Bargaining Power of Retailers

Roughly 80 % of Pandora's sales is generated through branded sales channels, hence not multi-branded sales channels. This gives multi-branded retailers poor bargaining power, which last time was also illustrated, when Pandora abandoned the cooperation with 600 multi-retailers in the US and Canada, as Pandora did not think they met their requirements (Pandora svinger øksen over 600 forhandlere, 2016). Such a maneuver illustrates that Pandora isn't particularly dependent on their multi-retailers, which also explains their strategy to focus on branded sales channels, and in particularly own and operated (O&O) shops. The paper has characterized the bargaining power of buyers as high.

5.2.5 Bargaining Power of Suppliers

Pandora is in a situation where they own and control most of their value chain, which is why Pandora has only few suppliers. These are, however, very important to analyze. The wage cost constitutes less than 5% of the cost of sold goods, where raw-materials constitutes more than 90%, as mentioned in the company description. Materials such as silver and gold is highly traded commodities, thus the prices are highly depended on supply and demand, but also interest rates and the economy in general. From this, Pandora's is in a high degree market takers, in terms of supply inputs. Consequently, Pandora has a policy of at least have 3 suppliers for their silver needs. This policy leverage their negotiation position in terms of delivery and payment conditions, but also gives them the ability to react quickly in terms of shift in demand. As seen in the financial statement analysis at Pandora's credit period (trade payables) has increased from 14 to 23 in the period from 2011-2015 The policy does that Pandora doesn't have to be dependent on one's supplier's supply strength in peak periods.

From a not "cost per kilo commodity" perspective, the bargaining power seems weak, and Pandora should benefit from this leverage position with good trade agreements. Fluctuations in commodities can in the short-run be secured with their rolling hedge, but Pandora will be affected by long-term (1 year) changes in commodity prices. The overall conclusion is that the bargaining power of suppliers is weak, but neither Pandora or the suppliers have direct influence on the general price setting. It is therefore difficult to make a general summary of this part of the model given the above. But developments in the commodity prices going forward will be perhaps the biggest threat / driver prospectively to Pandora.

5.2.6 Industry Rivalry

The thesis finds that the industry rivalry can be characterized to be moderate, and finds that the rivalry will be increasing in the long-run. The increasing rivalry will come from easier market access, which primary arises consequently from increasing e-commerce sales and cost effective brand-building through social media. What is going to be a hamper of rivalry in the industry (which makes today) is to see. McKinsey report that people want to buy branded jewelry. If we look at the Clothing Industry, there is a higher competition rivalry, however limited due to a natural "number" brands that will fit in people's minds. For now, Pandora is industry leaders with Cartier and Tiffany & Co. (Bloomberg, 2016). Many of Pandora's competitors is small and medium sized companies which is expected to increase in the future, with easier market access enabled through e-commerce.

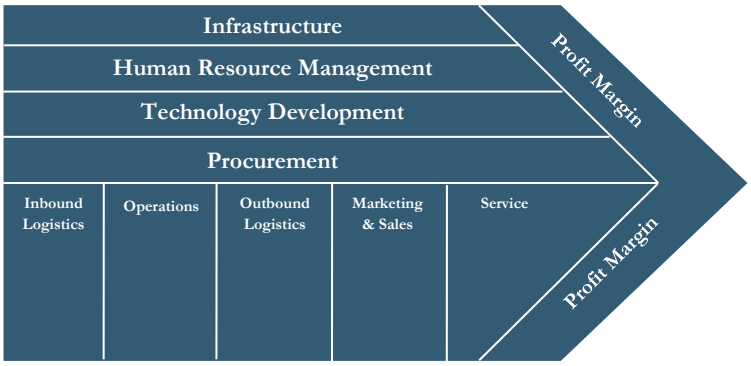
5.2.7 Recap of Industry Analysis

The main findings in the industry analysis refers to the bargaining power of customers and the threat of new entrants. As the industry is profitable it is highly attractive which implies a threat of new entrants. Pandora customers can be characterized as brand conscious, affecting that high branding maybe is the best safeguard against new entrants. The threat of new entrants is present, although the threat is not very high, despite the fact that e-commerce makes it easier to enter the market. Endless Jewelry is a great illustration of the conclusion of this threat; as it is easy to intervene in the market, but it's hard to really break through.

Pandora's customers did in 2011 a text-book example of showing price sensitivity, as Pandora upgraded its prices because of changes in commodity prices. This Pandora hit sales hard, and when the bad sales figures were released to the public, the share dropped 60%. The main threat identified is Pandora's customers, which is also consistent with the macro analysis, which found the development of commodity prices most important. Another key finding in the strategic analysis was the change in the jewelry market, where branded jewelry has taken a high market share of the total jewelry market. Several market reports suggest that this trend will continue. It is therefore extremely important for Pandora to continue to develop their brand as it is in this segment, the continued growth must be found. Finally, the paper concluded that the risk of charms-bracelets being a fad is no longer present, although there will be fashion trends within charms-bracelets. Therefore, it is important that Pandora capitalizes on their other jewelry categories, as the threat of substituted products high.

5.3 INTERNAL ANALYSIS

Figure 9 –Porter's Generic Value Chain



The thesis has now investigated the external environment surrounding Pandora, and it is now time to investigate the interval value creation boost, and constraints for Pandora. The analysis will use Porter's Generic Value Chain framework, where only the selected activities will be analyzed, to emphasize only the important factors that affect Pandora's internal value creation. The purpose with this analysis is to identify and assess value creation activities as well as its analysis its resources and capabilities. But first, the paper will provide an orderly insight into the Pandora business model that will be the backbone for the value chain analysis.

5.3.1 The Business Model

Pandora's business model can be characterized as vertically integrated, since Pandora's control and owns most step of the value chain. They control the whole value chain from the jewelry design, production and in some degree the sales. Such a business model indicates numerous characteristics of risks and advantages. From Managerial Economics Theory, owning most of the value chain could benefit to higher margins, if run effectively, since external players will demand a premium on their services or inputs. Since Pandora's jewelry production is handmade, the paper finds that is a realistic assumption to make. Furthermore, controlling the production has several advantages. Pandora has invested in a IT-system which is roughly similar to Zara's & H&M's, which sends "live-updates" on how the individual products sells in the concept stores (Carnegie Worldwide, 2014). This gives Pandora's flexibility since they don't have to commit of their stock well in advance of seasons and can therefore manufacture during the season. Obviously, this means they can respond to fashion changes quickly, and increase or reduce production as necessary.

On the other hand, owning the entire value chain will give higher fixed costs, since Pandora has to own and therefor invest in the entire value chain. But since Pandora's production is handmade, the investment in production facilities, is limited to buildings and tools. The business model is very important to understand Pandora's success. With the current business model Pandora takes advantage of low variable costs while their fixed costs seem limited. In addition, the control and ownership of the value chain gives opportunity to be very flexible, where product development time has become much shorter and can very quickly measure the demand for the individual products. With this business model, Pandora has been able to maximize their operating margins, but are still able to be flexible, since firing/hiring must be much more flexible than investing in new machinery and equipment. Consequently, Pandora has managed to achieve significant higher Asset Turnover (2.21) and Profit Margin (27%) than its peers. The financial effect will be further analyzed in the financial statement analysis.

5.3.2 Inbound Logistics, Production and Operations

Pandora sources raw materials and crafts them into jewelry in its production facilities in Bangkok, Thailand. It is important for Pandora to produce their own jewelry to secure the product quality and quick reaction time. Pandora has centralized their production in the same geographical area in Thailand. This gives Pandora economics of scale in terms of logistics and production, as the fixed costs are spread over more units per output, and the logistics are more centralized. It also indicates that they acquire knowledge regarding the production procedures and labor market in Thailand and thus, they can achieve lower incremental cost when they open a new facility in the country (as done in 2016). The risk side of centralizing the operations and production in one geographical area is that Pandora is very exposed to national risks in Thailand, such as currency risk, political risk and market labor risks. The current situation is in Thailand is for now very lucrative with low wage costs and tax exemption.

5.3.3 Marketing and Sales

As seen in Figure 17 Pandora invests in marketing and sales as "fixed" proportion of their revenue, which is not a law of nature. This shows that Pandora is serious on their goal; building a strong brand on a global scale. This strategy will mainly be targeted though marketing, but also though what Pandora denotes as a unique customer experience, which Pandora believes customers get through concept stores, as they only retail Pandora products and they can give the customers a branded experience. The strategy in approaching new geographical markets is utilized by using current distribution pats which can be succeeded in multi-branded retail channels. The Asia market is still a new market for Pandora and its hold a great potential for the company, since Pandora presence in the markets such as Japan and China is still limited. Asia Pacific holds half of the jewelry markets it motivates the company to invest more on this region the coming years.

One of Pandora's four main strategic goals is to invest in more branded sales channels, and in particular concept stores. This is aligned with the vison to become a global brand. This will further give less logistic costs since there will be a higher sale per sales point, and leads to less cash tied up in inventory. The reason why the paper will predict fewer number of sales points is the development of e-stores. Fashion jewelry is predicted to be in 10-15% of the sales by 2020 from the current 4 % fraction, which was also illustrated in Figure 5.

5.3.4 Technology and Product Development

Pandora's IT system, as mentioned earlier, is used in the product development. The process is known as sales-out data[12]. Pandora is using consumer-centric and market-led product development strategies and uses the data from the system to reach its goals. The system collects sales output from the concept stores, and they can use this information to inspire new products. An example could be if a certain pattern or color mixture is trending in sales, Pandora could use some of the same design in the design in their next product series.

As Pandora's products can be related to "fast fashion" as H&M and Zara can be described as, it is very important to spot and react fast on fashion trends. The data collect system also has the advantage of spotting slow moving products, where Pandora can turn off or throttle down production of the specific product quickly.

[12] "Future designs to large degree based on sales-out data" – Pandora presentation (PANDORA Investor Event, 2013)

Pandora has recently increased their online presence over the last years, for retain existing customers and to attract new customers. With increasing e-commerce predicted (McKinsey & Company, 2015) plans to focus on e-stores though out the globe for the coming years.

5.3.5 Human Resources

As social media has started to become more widespread in general, there has started a phenomenon which in Denmark is called "shit storm"[13]. An article from finans.dk shows 12 companies that have been hit by such a "storm", where it has cost businesses heavily e.g. Shell/Lego, VW (diesel gate) and Jensen's Bøfhus. These "storms" often occur because of the companies show unethical behavior towards animals, employees, competitors, customers, etc. There has also been much criticism of employee conditions, in the factory where Apple produced their products (Apple 'failing to protect Chinese factory workers', 2016). The employee conditions threat acts as a one from Pandora's side must take seriously. Pandora has even created an internal analysis very high satisfaction rate among its employees since 86% of them would recommend Pandora as a place to work. Although one should be critical for internal analysis, the paper has yet not found articles or documentaries which indicate poor working conditions for Pandora's Thai workers. As Pandora today is the largest Thai jewelry employer, it seems immediately true that Pandora has satisfied employees.

5.3.6 Recap on Internal Analysis

The main findings in the internal analysis refers to the, production, marketing, product development and human resources. The production in Thailand have great share in Pandora's value creation. With cheap labor salaries and a high manual labor force the production is asset light, as expanding production requires very limited capex spending. This advantage of this will be highlighted in the financial statement analysis. Pandora's product development is mainly driven by sales-out data, which is the "same" system as Zara and H&M uses. Several reports states that this particular system has been a mainstay in their success. Pandora also reports that future development will be based on this information's. Finally, the paper analyzed the risk of Pandora being hit by a "shit storm" in the human resources section. These "storms" often occur because of the companies show unethical behavior, for example, to employees. This risk seems disproved as employee satisfaction is high. The paper has done much research trying to find hints about poor working conditions, but this is not found.

[13] Directly translated from Danish

6 FINANCIAL STATEMENT ANALYSIS

In the previous part, the paper has analyzed the strategic parameters of Pandora. This gave key findings, which will be used in the forecasting of future residual operating income. However, in this section an investigation of Pandora's historical financial performance will be done, as this together with the strategic and quantitative industry analysis will provide the backbone for the forecasting.

Following, is a reformulation of Pandora's income statement, balance sheet and equity statement is primarily based on Penman (2013), but also with the knowledge gained from Plenborg & Petersen (2012). The purpose with the reformulation is to account for (*hidden/really*)[14] dirty surplus, and to separate financing activities from operating activities to get insight in core activities. The motivation for investigating hidden dirty surplus is based on the journal article *Do Investors Understand Really Dirty Surplus?* (Landsman, Miller, Peasnell, & Yeh, 2010). The article main findings where that "*findings show that dirty surplus and really dirty surplus are irrelevant for forecasting abnormal comprehensive income. However, findings also indicate that investors appear to undervalue really dirty surplus.*" (Landsman, Miller, Peasnell, & Yeh, 2010). Therefor it is important that the accounting numbers satisfies the clean surplus relation for the common shareholder's equity, as this relation is a requirement for both the ReOI and GE valuation model. The clean surplus relation states

$$CSE_\tau = CSE_{\tau-1} + OI - NFE - d_\tau$$

where CSE_τ denotes common shareholders' equity at time τ, OI denotes operating income at time τ, NFE denotes net financial expenses and d_τ denotes the net transactions with shareholder at time τ.

6.1 REFORMULATION OF FINANCIAL STATEMENTS

Before heading to the reformulations a brief description of (hidden) dirty surplus will be provided. The reformulated balance sheet, equity statement and income statement can be found in Appendix B.

6.1.1 Dirty Surplus

When companies report income items as part of equity rather than in an income statement it is dirty-surplus accounting. Thus, if an equity statement has no income other than net income from the income statement is a clean-surplus accounting statement, but this is rarely seen, at least in multinational enterprises[15]. As the most common reasons for dirty surplus are currency translation adjustments as well as unrealized gains/losses on securities and derivatives. This implies that the paper has to ensure that all revenues, expenses, gains and losses in the forecast period is recognized in the forecasting period.

6.1.2 Hidden Dirty Surplus

Hidden dirty surplus accounting often occurs when executive employees and board members have the possibility to acquire options or shares below the market price. If this is the case, the shareholders will face a loss, when the share or options are triggered at a discount. This is however, not an accounting loss and will

[14] The paper will use the term *hidden* dirty surplus.
[15] An enterprise operating in several countries but managed from one "home" country (Lasserre, 2012).

therefore not be presented in the financial statements. This motivates for the question; why do shareholders authorize these options? The idea for the shareholders to give some employees this opportunity, is to motivate key employees and board members to deliver in the long-run, which ultimately will increase the value of the stocks (Berk & DeMarzo, 2013).

6.1.3 Reformulation of the Equity Statement

The reformulation of the equity statement is done by investigating the changes there have been in the equity through-out the period, and thereby re-classify the items which has been classified inaccurate. This is done to identify transactions with owners and any dirty surplus items and other comprehensive income in the equity. Basically, the reformulation of the equity statement ensures that the changes in equity that all aspects which is affecting the owners, is included in the analysis.

6.1.3.1 Share based options

Pandora allocates stock options which are taken directly to equity. These stock options are subject reformulation classified as a liability on the balance sheet instead. These share options are dependent on an unknown EBITDA and sales target, and thus the paper has not adjusted the value of these options and thus assumed that they are fair priced.

6.1.4 Reformulation of the Income Statement

The main purpose of the income statement reformulation is to derive the key figure operating income (OI). To get here it is identified that production sales distribution marketing and administrative expenses all include depreciation in the official annual report. Therefore, depreciation at first added to the items (production sales distribution marketing and administrative expenses), so it is possible to derive the key figure EBITDA.

6.1.4.1 Other Operating Income Items

In the analysis of total income, it appears that some items should be re-classified to "other operating income":

Value adjustment of hedging instruments: Included only in comprehensive income. The hedging instruments to hedge foreign exchange and commodities. Therefore, this item is classified under "other operating income" as it relates to the operation, but not to the sale directly.

Exchange rate adjustment of investments in subsidiaries: Included only in comprehensive income and cannot be classified as directly related to the sales, which it should be classified as "other operating income".

Regulation of the CWE earn-out: Is posted as financial income and related to a previous earn-out agreement with a franchise owner[16]. Such an item is not directly related to sales, but still related to the operation, and must thus be classified under "other operating income".

[16] Jesper "Kasi" Nielsen

6.1.5 Reformulation of the Balance Sheet

In the reformulation of the balance sheet the main goal is to separate financing items from operations. The balance sheet is further separated into operational short- and long-term assets, as well as operational short- and long-term liabilities. The main purpose of reformulation of the balance sheets is in order to derive the figure Net Operating Assets. This makes it more manageable to see which assets drive profitability.

6.1.5.1 The asset side

On the asset side of the balance sheet the items "Other non-current financial assets" and "cash and cash equivalents" classified as financial assets. The paper chooses not to take a share of "cash" item to operating activities, although some books suggest this.

Financial (hedging) instruments: This is classified as an operating item. From the strategic analysis it is clarified that hedging instruments is a crucial part of Pandora's operations. And therefore, the paper chooses to classify financial instruments as a part of the Net Operation Assets. The paper is aware that financial instruments often is classified as financial assets, as it is a highly liquid asset.

6.1.5.2 The liability side

On the liabilities side, "Loans and other payables" (short and long) classified as a financial liability. From changes in equity we know from the previous section to share-based accompanied been posted as a liability. Income tax payable is classified as a financial item because it is interest-bearing. Financial instruments are classified as operating giving the argument above, although it is interest bearing.

In Table 2 highlights the key balance sheet figures and their development. It is clear that NIDB is historical has been very low but Pandora has taken up more debt in 2015. NOA has been quite stable, which is impressive due to the fact of Pandora revenue growth. NWC yields the same conclusion.

Table 2 – Key Figures, Balance Sheet

DKK(m)	2011	2012	2013	2014	2015
Net Interest Bearing Debt (NIBD)	519	74	-139	-577	1,865
Net Operating Assets (NOA)	5,930	6,092	6,259	6,285	7,877
Net Working Capital (NWC)	1,434	1,524	1,442	969	1,179

Source: Pandora annual rapports and own contribution.

6.2 COMMON SIZE AND TREND ANALYSIS

In this section the paper will briefly analyze the now, reformulated financial statements, by using the two simple methods, common size and trend analysis. This analysis is rather superficial, but gives a nice overview of Pandora's financial history. The beauty of this analysis is that, one can quickly get an overview of key figures, and then dive further down into the underlying component's when wonderment or curiosity arises. Numbers for all figures can be found in Appendix B.

6.2.1 Trend Analysis

In the table below, the trend analysis is conducted based on Pandora's reformulated income statements where 2011 is the base year[17]. From the table, we can see the accounting numbers for Pandora is in index numbers.

Table 3 – Trend Analysis, Income Statement

Percentage	2011	2012	2013	2014	2015
Revenue	100%	100%	135%	179%	251%
- Cost of sales	100%	124%	167%	195%	255%
Gross Profit	100%	91%	124%	174%	250%
EBITDA	100%	73%	126%	188%	267%
EBIT	100%	72%	130%	198%	282%
Operating income (after tax)	100%	72%	91%	199%	228%
Comprehensive income to common	100%	76%	102%	207%	227%

Source: Pandora annual rapports and own contribution.

From Table 3 we can see that the revenue has the period increased by 2.5 times in a three-year period which is very impressive. Another important notice is that the production costs are somehow proportional with the revenue, which provides knowledge for the forecasting period. Pandora has achieved a high annual growth in all margins.

Table 4 shows, key balance figures for Pandora in index numbers. NIDB trend is quite useless given Pandora's low net borrowing. The analysis of this figure is therefore very sensitive to changes from year to year. NOA or invested capital has increased 33% though out the period, whereas the revenue has increased 250%. This clearly illustrates the advantage of having a large manual labor, as Pandora can expand production rapidly without making significant CAPEX spending. NWC has shown a downtrend which is very interesting although it seems quite volatile. This will be analyzed later in the section.

Table 4 – Trend Analysis, Balance Sheet

Percentage	2011	2012	2013	2014	2015
Operating Assets (OA)	100%	103%	109%	119%	156%
Operating Liabilities (OL)	100%	102%	119%	159%	230%
Net Operating Assets (NOA)	100%	103%	106%	106%	133%
Net Interest Bearing Debt (NIBD)	100%	14%	-27%	-111%	359%
Net Working Capital (NWC)	100%	106%	101%	68%	82%
Common Shareholder Equity (CSE)	100%	111%	118%	127%	111%

Source: Pandora annual rapports and own contribution.

[17] The analysis is sensitive to the base year, however given Pandora's only 6 released annual rapports since the company went public (and therefor accounting standard) the paper has found it most informative to get a long a number of years included in the analysis. One could however argue to choose a later year as it is from here Pandora has really evolved.

6.2.2 Common Size Analysis

The common size analysis is conducted on the key figures from the income statement. Opposite trend analysis, the take common-size analysis uses each year's revenue as a base for the analysis.

Table 5 – Common Size Analysis, Income Statement

Percentage	2011	2012	2013	2014	2015
Revenue	100%	100%	100%	100%	100%
- Cost of sales	-27%	-33%	-33%	-29%	-27%
Gross Profit	73%	67%	67%	71%	73%
EBITDA	34%	25%	32%	36%	36%
EBIT	31%	22%	30%	34%	35%
Operating income (after tax)	28%	20%	19%	32%	26%
Comprehensive income to common	26%	20%	20%	30%	24%

Source: Pandora annual rapports and own contribution.

Table 5 shows, that in general Pandora has had a positive development of their income margins. From the previous analysis it is known that Pandora's cost of sales is very sensitive to commodity prices on silver and gold, and therefore we see small fluctuations in the gross margin.

6.3 PROFITABILITY ANALYSIS

The main purpose of the profitability analysis is to gain insight on the drivers behind the return to common shareholders, ROCE. The analysis is based on a decomposition of ROCE based on (Penman, 2013). ROCE is basically driven by the return on invested capital and return on financial assets. From the reformulated statements ROCE is calculated as the following

$$ROCE_t = \frac{CI_t}{(CSE_{t-1} + CSE_t)/2}$$

where CI is comprehensive income and CSE is common shareholder equity.

6.3.1 First Breakdown

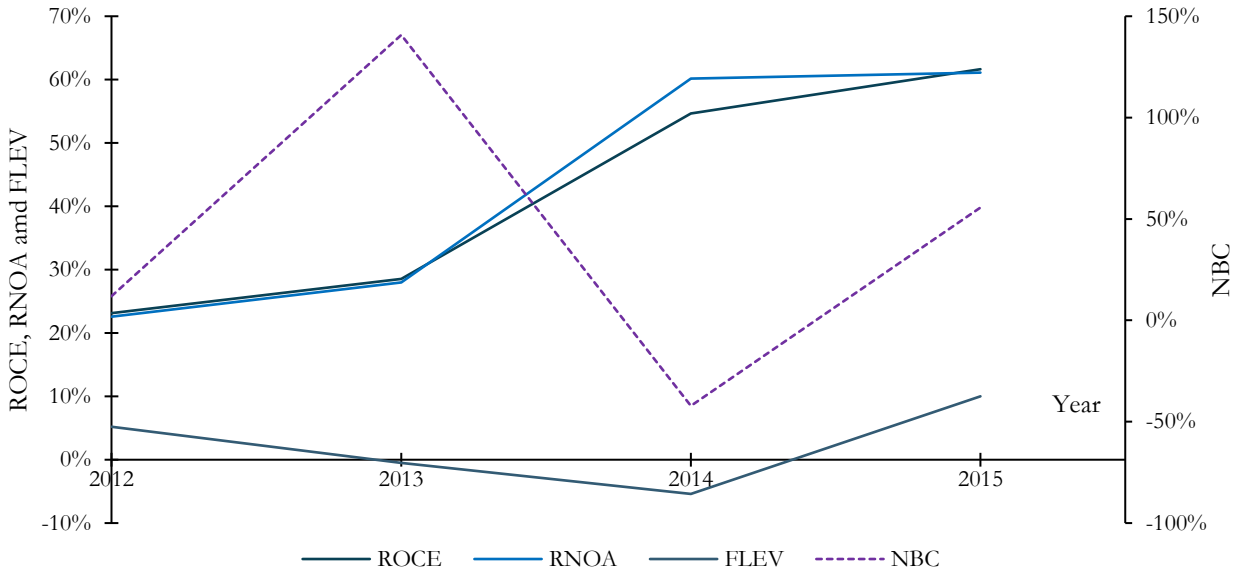
The first step in the analysis is to separate the financing and operating activities apart. Here it is important to separate gearing, as financial gearing affects the return on equity. Importantly to understand that the net operating assets are financed by both equity and net financial obligations. Thereby, the financial leverage to help affect ROCE in positive and negative direction. An analysis of Pandora's capital structure will be made later in the project. ROCE is decomposed as the following

$$ROCE = RNOA + \left[\underbrace{\frac{NFO}{CSE}}_{FLEV} \cdot \underbrace{(RNOA - NBC)}_{SPREAD} \right]$$

Here it is clear that ROCE consist of three parts; an operational component (RNOA), a financial component (NBC) and a fraction known as financial leverage (FLEV), which is the fraction of net financial obligations

(NFO) to common shareholder equity (CSE). From the above formula, it can be seen that if a company has no gearing, ROCE will be equal to RNOA. Pandora has had in the invested period both net financial obligations but also net financial assets. Depending on the spread between RNOA and NBC is positive determines whether it is a favorable financial leverage.

Figure 10 – ROCE Breakdown



Source: Pandora annual rapports and own contribution.

Figure 10 shows, that that the return on the invested capital (RNOA) is higher than the return on equity (ROCE) in 2014, because of negative FLEV. This is because the NFA are not able to make the same return as RNOA. The breakdown of RNOA "core" and "other" can be found in Appendix B.

6.3.2 Second Breakdown

RNOA is driven by two parameters; profit margin (PM) and asset turnover (ATO). The following table summarizes the two parameters development:

Table 6 – RNOA Breakdown

Percentage and numerical	2012	2013	2014	2015
RNOA	23%	28%	60%	61%
PM	18%	24%	27%	24%
ATO	1.11	1.46	1.90	2.36
1/ ATO	0.90	0.69	0.53	0.42

Source: Pandora annual rapports and own contribution.

RNOA measures how profitable Pandora is to use its net operating assets to generate profits. Operating margin measures the profit of one DKK sales from the company's operating activities, the ATO measuring sales per. money invested in net operating assets. The inverse ATO is thus a measure of how much capital is bound in

net operating assets to create one DKK sales. By looking at the profit margin (PM) is seen to Pandora have improved their profit margins significantly through the reformulated period. Pandora has also improved their asset turnover rate significantly; it is seen that the funds tied up in net operating assets to create one DKK sales has halved in the period. This will be discussed further in third breakdown, where PM and ATO is decomposed.

6.3.3 Third Breakdown

In this level the paper will analyze profit margin and the asset turnover rate further. Table 7 shows a decomposition of the profit margin:

Table 7 – Profit Margin Breakdown

Common-size	**2011**	**2012**	**2013**	**2014**	**2015**
Revenue	100%	100%	100%	100%	100%
Cost of sales	-27%	-33%	-33%	-29%	-27%
Gross Profit	**73%**	**67%**	**67%**	**71%**	**73%**
Sales, distribution and marketing expenses	-28%	-30%	-26%	-25%	-27%
Administrative expenses	-11%	-12%	-9%	-10%	-9%
EBITDA	**34%**	**25%**	**32%**	**36%**	**36%**
Depreciation, amor. and impa. losses on cost of sales	0%	0%	0%	0%	0%
Depreciation, amor. and impa. losses on sales, distribution and marketing expenses	-2%	-2%	-1%	-1%	-1%
Depreciation, amor. and impa. losses on administrative expenses	-1%	-1%	-1%	-1%	-1%
EBIT	**31%**	**22%**	**30%**	**34%**	**35%**
Tax on EBIT	-4%	-4%	-6%	-7%	-11%
NOPAT	**27%**	**18%**	**24%**	**27%**	**24%**
Operating profit from other comprehensive income, after tax	1%	2%	-5%	4%	2%
Operating income (after tax)	28%	20%	19%	32%	26%
Comprehensive income to common	26%	20%	20%	30%	24%

Source: Pandora annual rapports and own contribution.

Investigated the strategic analysis, the paper found that Pandora is heavily dependent on commodity prices which stands for roughly to 90% of the cost of goods sold. It is not surprising that Pandora's profit margin has been slightly fluctuating throughout the period. Production costs are though roughly proportional to the profit margin, however, seen an impact of the tax in 2015. Basic comes fluctuations of production. Gross profit, EBITDA, EBIT has strengthened over the years. An analysis of cash bindings will be discussed later in this section. Table 8 shows, the drivers which contributes to the asset turnover rate.

Table 8 – Asset Turnover Breakdown

Common-Size	2012	2013	2014	2015
Intangible assets	67%	51%	40%	31%
Property, plants and equipment	7%	5%	5%	6%
Inventories	22%	16%	13%	12%
Trade receivables	14%	10%	8%	7%
Other operating assets	9%	10%	8%	8%
Provisions	-6%	-5%	-5%	-5%
Trade payables	-4%	-4%	-6%	-6%
Other operating liabilities	-20%	-14%	-11%	-10%
1/ATO	90%	69%	53%	42%
Net Working Capital	32%	22%	16%	13%
Other Net Operating Assets	58%	47%	36%	29%
ATO	1.11	1.46	1.90	2.36

Source: Pandora annual rapports and own contribution.

The table above shows the underlying drivers for ATO. Net working capital includes inventories, trade receivables and suppliers. Through the reformulated period shows that the net working capital is reduced in relation to turnover, which means that Pandora gets more out of a penny tied in net operating assets now than they did in 2012. Thus, the improvement of the asset turnover rate. The less net working capital reduces NOA and therefore we can directly see the positive effect on RNOA, which is the main value driver for out ReOI valuation model.

6.3.3.1 Money Bindings

In the two tables below, Pandora's turnover rates and money binding (days) is listed.

Table 9 – Turnover Rates

Turnover rates	2012	2013	2014	2015
Trade receivables	7.23	9.82	11.91	13.55
Inventories	4.55	6.42	7.52	8.28
Trade payables	26.24	23.77	17.78	15.69

Source: Pandora annual rapports and own contribution

Table 10 – Money Binding, Days

Days (365)	2012	2013	2014	2015
Trade receivables	50	37	31	27
Inventories	80	57	49	44
Trade payables	14	15	21	23

Source: Pandora annual rapports and own contribution

All three turnover rates show a very positive trend as that they use their inventory faster. The turnover rate for trade receivables has increased from 7 to 13.5 which means that Pandora receive their payments debtors twice

as fast. The payments now come within 27 days instead of 50 days on average. This improves liquidity and value creation (lower NWC). Inventory turnover has increased from 4.5 to 8 which means that Pandora now converts inventory into cash twice as fast as before. Items in the inventory used to be in stock for 80 days, but has improved so it's today only is in stock in 44 days. As with the trade receivables this is improving the free cash flow. Trade payables turnover has improved from 26 to 15.5 which means that Pandora has better credit conditions with their creditors. In 2011 Pandora has 14 days to pay their creditors whereas today the has 23 days on average. This yields the same positive effect as the two other turnovers. All this contributes to Pandora cash, which is by far the most improved asset on the balance sheet, which can be seen in the table below. This explains the delimitation of not conducting a liquidity analysis of Pandora.

Table 11 – Trend in Cash

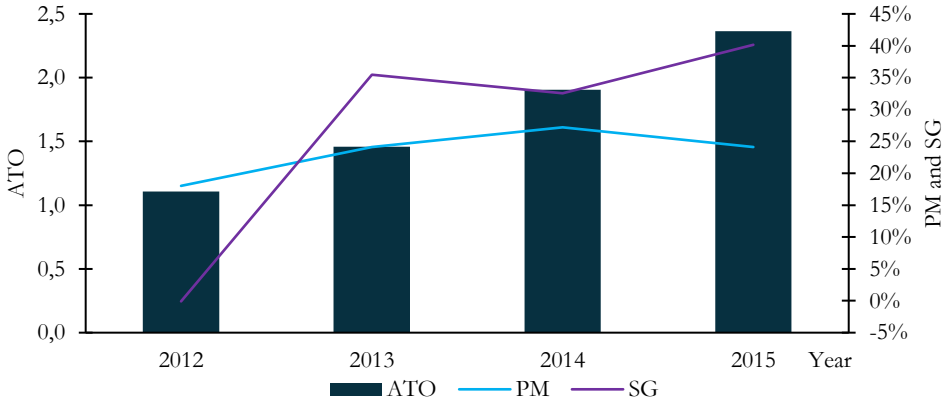
Trend	2011	2012	2013	2014	2015
Cash	100%	194%	390%	643%	505%

Source: Pandora annual rapports and own contribution

6.4 Recap of Financial Statement Analysis

Through the reformulated period, it is seen that both the profit margin and asset turnover both have been increasing. The return on common equity and invested capital is very high approx. 62% and 61% respectively in 2015. Pandora has been very good at reducing their capital tied up in assets and extend the credit period from suppliers, which have effected Pandora's liquidity and value creation. ROCE is primarily driven by RNOA. Overall it should be noted that Pandora has managed to increase sales growth significantly, while improved their net working capital alongside. Figure 11 sums up Pandora impressive development overall, with increasing ATO, Sales growth and profit margin throughout the period.

Figure 11 – ReOI Value-drivers



Source: Pandora annual rapports and own contribution.

7 QUANTITATIVE INDUSTRY ANALYSIS

The Quantitative Industry Analysis will give insight on how the ReOI value drivers behave for a Pandora "like" company. The analysis will consist of two parts; a visual analysis of fade rate diagrams of "widely defined peer group" and a times-series analysis where persistence and long-run level parameters of ReOI value drivers will be determined for a "carefully selected peer group". In addition to the three ReOI value drivers, the analysis will be conducted on the Market-to-Book ratio, since the valuation will be made with two different methods of calculating the continuing value; to be precise, the long-run Market-to-Book and the more traditional solution Gordon's Growth Model. The article (Nissim & Penman, 2001) "*Ratio Analysis and Equity Valuation: From Research to Practice*" is foundation for the analysis, with minor differences. The differences will be highlighted and argued when relevant.

7.1 EMPIRICAL BACKGROUND FOR THE ANALYSIS

The article (Nissim & Penman, 2001) is based on empirical data from US companies in the years 1963-1999. The basic idea of this article is to show that corporate fundamentals overtime will migrate to certain industry-specific levels. The theory arises from microeconomic theory that above-normal profit can only be maintained for a limited time. Consequently, will industries with above-normal profits will be penetrated by new entrants that will flow to thereby eliminate the above-normal profits, due to price competition. Conversely, companies with below-normal profit either improve, go bankrupt or be acquired / merge. These conditions will affect the profitability for the companies within the industry, thus will the company's profitability converge to a common level in the industry. An important assumption of the above, is that the markets to some degree is effective so that for example not exist political monopoly etc. This will be helpful after the explicit forecast to model how Pandora's value drivers will converge to a long-run level.

7.2 DATA SELECTION AND VALUE DRIVERS

7.2.1 Peer Group Selection

The first step for the analysis is to conduct a broad peer group for Pandora. The paper has chosen to use the most common classification standards wherein Pandora is located. From a Bloomberg Terminal, the following classifications can be found which is seen in *Table* 12. Extracting the "tickers" to Excel and then applying the "Unique Records Only" function in Excel, gets a list of companies relevant for Pandora, as some firms appears in more than one classification. Since some companies had way insufficient accounting items on Bloomberg to make the analysis, the list was roughly sorted. After the "rough" sorting, there were 74 companies in the broad peer group. (See Appendix C)

This number of companies seems sufficient as 50 companies is considered as a minimum (Christensen, 2015). The obvious problem with extending peer group, is that there will be companies in the peer group deviating more significant for Pandora, than from the chosen peer group. As the chosen peer group includes companies such as Nike, Adidas and leather fashion manufacturers, the paper assess that a broader peer group will weaken the analysis, more than it will strengthen by a larger information base from a larger peer group.

Table 12 – Selection Criteria for Industry Peer Group

Comp Source (Classification)	Specification	Region	Market Cap >
BICS Best Fit (Algo)	Jewelry & Watches Stores	Global	6B DKK
SIC (Standard Industry Classification)	5944 - Jewelry Stores	Global	6B DKK
GICS (Global Industry Classification Standard)	Apparel, Accessories & Luxury Goods	Global	6B DKK
ICB (Industry Classification Benchmark)	Clothing & Accessories	Global	6B DKK

Source: Own contribution & Bloomberg L.P. (2016)

7.2.2 Time Period and Accounting Items

The recommended/applied data source by (Nissim, 2001) is using the Compustat Global database for extracting the relevant accounting numbers for the chosen peer group. Since the variables has changed name since the article was conducted the paper finds using a Bloomberg Terminal more convenient, effective and just as correct. Across all years from 1990 to 2015 and a total of 74 firms are selected to be in the broad peer group selected to make the analysis.

The following variables are extracted from Bloomberg to calculate the value drivers in the ReOI model and the Market-to-Book Ratio: Total Revenue (RT), Earnings before interest and taxes (EBIT), Income tax expense (TXT), Weighted Average Cost of Capital (WACC), Other short term investments (OSTI), Cash items (Cash), Total assets (TA), Total liabilities (TL), Long term borrowings (LTB), Short term borrowings (STB), Preferred equity (PE) and Enterprise Value (V). With this information, the calculations of the value drivers and Market-To-Book can be done.

7.2.3 Value Drivers

Net Operating Assets (NOA) is calculated from Operating Assets (OA) and Operating Liabilities (OL):

$$NOA_\tau = OA_\tau - OL_\tau$$
$$OA_\tau = TA_\tau - OSTI_\tau - CASH_\tau$$
$$\mathrm{OL}_\tau = \mathrm{TL}_\tau - \mathrm{LTB}_\tau - \mathrm{STB}_\tau - \mathrm{PE}_\tau$$

Operating Income (OI) is calculated as the following:

$$OI\tau = EBIT_\tau - TXT_\tau$$

With these two numbers calculated; the value drivers and the ratio can be calculated.

$$ATO_\tau = \frac{RT_\tau}{NOA_{\tau-1}}$$
$$SG_\tau = \frac{RT_\tau - RT_{\tau-1}}{RT_{\tau-1}} = \frac{RT_\tau}{RT_{\tau-1}} - 1$$
$$PM_\tau = \frac{OI_\tau}{RT_\tau}$$

7.2.4 Market-to-Book

Besides the tree value drivers of residual operating income; the Market-to-Book ratio is to be analyzed in the quantitative industry analysis. As mentioned earlier the paper will use two different methods to determine the

continuing value. One of the methods relies on an estimate of a "fair" long-run market-to-book ratio. For a long-run ratio to be found, a fade-rate diagram will be constructed as the value drivers, and the same group of firm will be used. The Market-to-Book value is defined as:

$$MB_\tau = \frac{V_\tau}{NOA_\tau}$$

where V= Where market value of common stock + market value of preferred equity + market value of debt + minority interest - cash and investments.

7.3 METHODOLOGY AND ASSUMPTIONS

Using the method proposed by (Nissim, 2001), with only minor adjustments, the fade-rate diagrams for each of the three value drivers and the Market-to-Book ratio can now be constructed. Below, is a short description of the methodology used for constructing the fade-rate diagrams. Afterwards the section will investigate the assumptions and thus implicit problems of this method.

7.3.1 Methodology

- For each year, and each value driver, the companies are ranked into quantiles based on the value driver.
- Based on the ranking, the firms are group into four portfolios for each year and for each value driver, where the Portfolio 4 consist the highest 25 % values and so forth. Additionally, there is made a "peers" portfolio, which contains Pandora's closet peers, to investigate if there is any specific pattern in the behavior of the firms considered most like Pandora[18].
- The portfolio's is observed in the five following years, and the median is calculated[19].
- The above approach is done in a rolling manner, where we construct a new portfolio each year and follow them for the next five years.
- This gives 20 time periods, where a grouping into 5 portfolios is conducted and then followed for the next 5 years.
- The average value across the different time periods is calculated.[20]
- This results in data table from where a fade-diagram can be made for each value driver.
- The fade rate diagrams show the evolution of the value driver for a five-year period.

7.3.2 Assumptions

The above methodology is based on a number of assumptions which may be problematic. The paper finds that the following four is worth mentioning, investigate and possible treat.

- Equally weighting of companies: Since the firms are equally weighted, it is assumed that each company has the same size. This is indeed an unrealistic assumption; however, it is necessary. Given the quit large company pool and the minimum market cap of 6B USD, the assumption this will not ruin the analysis.

[18] This specific peer group will be explained and argued in the *Parameters Estimation* section.
[19] Median is chosen to eliminate the effect of outliers (Nissim, 2001)
[20] Calculating the average in order to eliminate the effect of business cycles (Nissim, 2001).

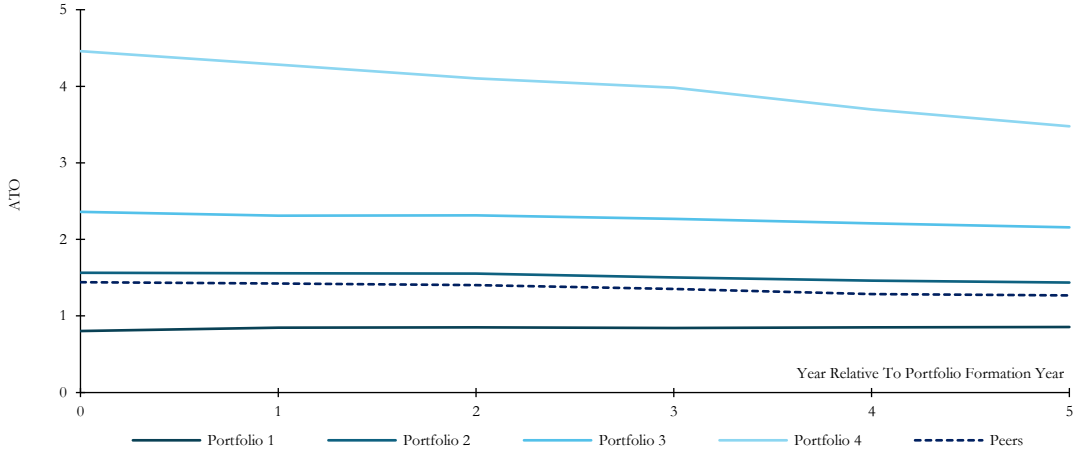
- Survivorship bias: Since some companies eventually will default, they will not be included in the data-set. This will form the basis of an upward bias in the value driver, since large negative values will not be in the sample. This will particularly effect the long-run sales growth; thus the long-term sales growth will be replaced with an a forecasted long-run nominal level of GDP. Sales growth considerable higher than the growth in the overall economy in the long-run is highly unlikely. This adjustment will also remove the effect of the following problem.
- Inorganic growth: This activity will primarily affect the long-run level of sales growth, since mergers and acquisitions will have an impact on the sales growth. This is up-ward bias is taken care of in the previous point.
- Chosen broad peer group: Companies chosen is considered roughly similar to Pandora, but there could potentially be companies (e.g. conglomerates) in the dataset which differ significantly in terms of main operation and accounting practice.

7.4 VISUAL ANALYSIS OF FADE RATE DIAGRAMS

Below the analysis of each of the tree value drivers and long-run Market-to-Book ratio will be conducted. Changes in value drivers can be found in Appendix C.

7.4.1 Asset Turnover (ATO)

Figure 12 – Fade Rate Diagram of Asset Turnover



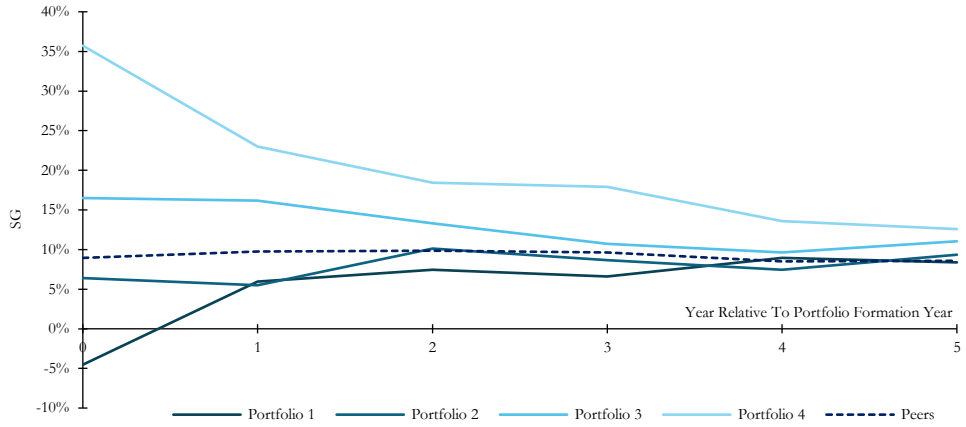
Source: L.P. Bloomberg 2016 & own contribution.

Figure 12 shows that the that there is no considerable mean reversion in the ATO, and must therefore be considered to be quite persistent. An important reminder from the figure is that it is very important to be extremely precise and careful in the peer group selection for the time-series analysis, where a and ω is to be estimated. We can from the figure see that there is very high difference in the asset lightness of the firms within the broad peer group. Pandora's is to be considered an asset light firm, and has currently a ATO of approx. 2.5, which is still quite fare behind the companies in Portfolio 4. Although it is in portfolio 4 that we see some degree of mean reversion although it is not particularly significant. A possible explanation for Portfolio 4 extremeness it's if it contains firms with a small number of assets while still generating a high amount of revenue,

which could be possible for retailers that have outsourced their production, thus explains where Pandora doesn't appear in portfolio 4, but in Portfolio 2.

7.4.2 Sales Growth (SG)

Figure 13 – Fade Rate Diagram of Sales Growth

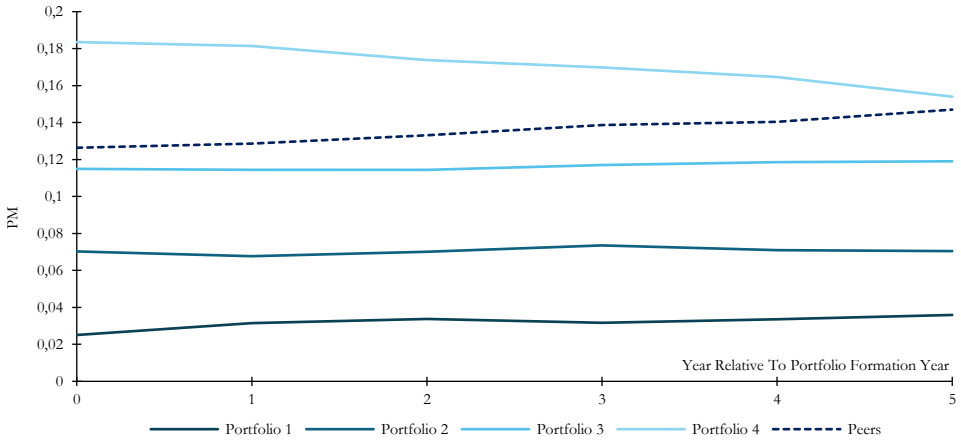


Source: L.P. Bloomberg 2016 & own contribution.

SG shows a clear mean reversion unlike the ATO diagram. It is worth noticing that the long-run level seems to be at around [8%-12%] which is considerable higher than the overall economy. Therefore, as mentioned in the *Assumptions* section, the long-run level will be adjusted with the estimated long-run level for the overall economy, as inorganic growth and survivorship-bias in the dataset has formed basis for an up-ward bias. The Peers portfolio seems to be quite persistent which is because of Pandora's main peers is mature companies which explains the more stable sales growth compared to Pandora. This raises concerns when the parameters are to be estimated, since a very persistent parameter for Pandora, will keep their current high sales growth persistent for a long time period in the fade period, which does not seem realistic. This provides motivation to not only analyze a small narrow peer group in time-series analysis, but take several portfolios into the analysis, in order to get insight of the sensitivity of the selected peer group. From the different values it is possible to assess whether the estimated values are realistic and corresponds to the conclusions from the strategic analysis.

7.4.3 Profit Margin (PM)

Figure 14 – Fade Rate Diagram of Profit Margin

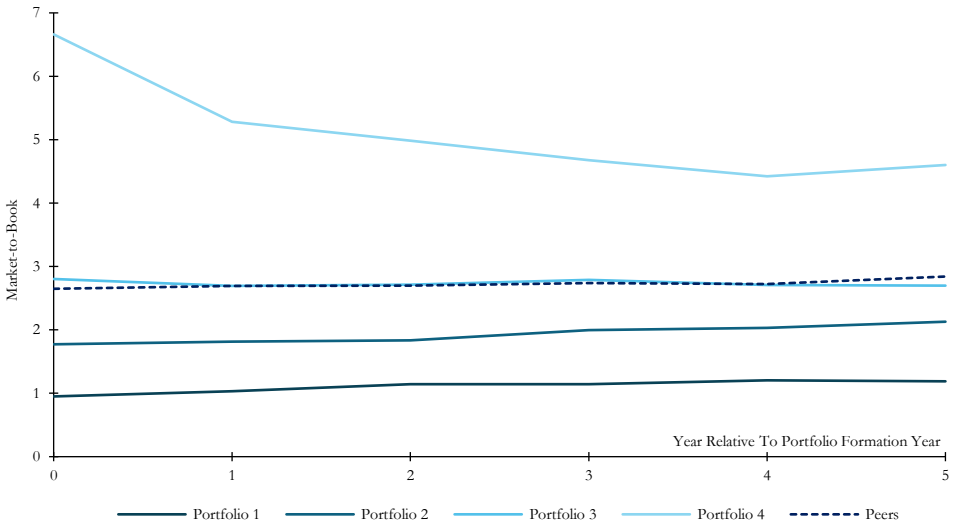


Source: L.P. Bloomberg 2016 & own contribution.

From *Figure 14* it is clear that PM has strong persistence. The difference in the profit margin can be explained by the individual firms' ability to establish a competitive advantage, which could be logical in the fashion industry, where fashion producers historically had sold products with high profit margins. The low mean reversion suggests that the competitive advantage will take long time to fade out. It is noteworthy that Peers portfolio has a slightly rising trend. Since the selected peer group is jewelry companies with strong brands, you can interpret it as that it as the peer firms has capitalized on the increased brand awareness among consumers (McKinsey & Company, 2013) by improving margin over the period.

7.4.4 Market-to-Book

Figure 15 – Fade Rate Diagram of Market-to-Book



Source: L.P. Bloomberg 2016 & own contribution.

The pattern seen in Figure 15 is roughly like the asset turnover diagram, and yields the same possible explanation. Only the long-run level of the asset turnover is important for the analysis, since this is used for the calculation of the continuing value.

7.5 TIME SERIES ANALYSIS

To estimate the parameters in from the Quantitative Industry Analysis, a time-series analysis is performed. The time-series analysis is made to quantify the persistence and long-term levels of the value-drivers and the Market-to-Book ratio. The time-series analysis is made with an autoregressive estimation produce, where the autoregressive process of order 1 is chosen[21] in order to capture the persistence in the variables which makes it possible to calculate the long run level.

The AR (1) model is thus, given by

$$X_{t,t} = c + \omega X_{t,t-1} + \epsilon_{t,t}, i = 1, \dots, N\ , t = 1, \dots, T$$

Where i denotes the cross-sectional dimension and t denotes the times series dimension. X is the parameter/value driver under investigation, c is a constant, and ω is the autoregressive coefficient that describes the mean reversion in the parameter under investigation. A high value for ω [-1;1] implies a high degree of persistence, which will result in a slow reversion towards the long-run level. If ω equals 1, the parameter under investigation will not converge. The long run-level α thus given by

$$\alpha = \frac{c}{1 - w}$$

The forecasted value at a given time *h* is given by

$$E_t(X_{t+h}) = \alpha + \omega^h(X_t - \alpha)$$

This formula is particularly relevant, since the time-series analysis will be used to obtain parameters that can be used to forecast future levels.

7.5.1 Peers* for Parameter Estimation

In the visual analysis, the same peer group selected for all figures. This section of the analysis pointed out how critical it is to choose the right peer group when the parameters is to be estimated. Therefore, the peer* group is different for each of the estimated value drivers. The selected peer group is selected by the companies as roughly the same ratios as Pandora we have at the end of the explicit forecast.

7.5.2 Estimation of Parameters

The first step in the estimation procedure is to calculate the residuals for each time and for each firm using initial values for α and ω. Formally written as:

$$u_{it}(\overline{\alpha}, \overline{\omega}) = (x_{it} - \overline{\alpha}\ ) - \overline{\omega}(X_{i,t-1} - \overline{\alpha})$$

[21] Normally written as: AR(1)

From with residuals calculated for each time period and each firm, the sum of squared residuals is calculated:

$$SSR(\overline{\alpha},\overline{\omega}) = \sum_{i=1}^{i}\sum_{T=t-1}^{t}\left(u_{it}(\overline{\alpha},\overline{\omega})\right)^2$$

Then the estimates of α and ω are found by minimizing SSR (least square estimation) over the set of feasible values of α and ω using solver. This estimation procedure yields the following results which can be seen in Table 13.

Table 13 – AR(1) Estimation of Parameters

Parameter	Sample	$\boldsymbol{a}$	$\boldsymbol{\omega}$	SSR	Observations
Sales growth	Peers*	0.070114525	0.789252222	2E-08	166
	BICS: Jewelry & Watches Stores	0.075292659	0.921637986	3E-08	162
	Wide Industry	0.051357911	0.193455245	9E-05	916
	Arithmetic average	0.065588365	0.634781818		
Profit margin	Peers*	0.220731010	0.780828598	3E-08	80
	BICS: Jewelry & Watches Stores	0.082963361	0.714814269	4E-07	167
	Wide Industry	0.086192769	0.771530123	7E-06	969
	Arithmetic average	0.129962380	0.755724330		
Asset turnover	Peers*	1.066200672	0.63106383	2E-09	135
	BICS: Jewelry & Watches Stores	1.071851703	0.54793877	4E-07	158
	Wide Industry				
	Arithmetic average	1.069026188	0.393000867		
Fair market-to-book	Peers*	2.893889513	0.048382786	2E-05	69
	BICS: Jewelry & Watches Stores	2.843323351	0.083764241	8E-05	142
	Wide Industry	0.748859790	0.000190012	3E-05	810
	Arithmetic average	2.162024218	0.044112346		

Source: Bloomberg and own contribution.

Sales growth: As mentioned earlier the paper will not use the long-run level for sales growth. Instead the paper uses a long-term growth rate of 4.5% as suggested by (Nekrasov and Shroff, 2009).

Profit margin: The profit margin is based on the selected peer group, which in this case is the "original" 6 close peers for Pandora.

Asset turnover: The sample estimation was very unstable and is therefore put out. As the asset-turnover rate of both peers and the BICS code in general looks stable, the average is used in forecasting.

Fair market-to-book: Pandora's current market-to-book ratio is approx. 13. As the closest peers estimates the highest long-run market-to-book ratio these estimates are used.

8 FORECASTING

As mentioned in the Quantitative Industry Analysis the value driver of the ReOI model is sales growth, profit margin and asset turnover. The forecasting will therefor focus on underlying parameters of these value drivers. The Quantitative Industry Analysis gave us key knowledge for the forecasting, but will mainly be used after the explicit forecasting is done. The explicit forecasting will be done until 2020, after which the parameters estimated in the Quantitative Industry Analysis will be used to forecast in fade period.

8.1 EXPLICIT FORECAST

8.1.1 Revenue

From the strategic analysis and mainly the value chain analysis the paper found three specific parameters for Pandora's historically sales growth

1. Concept store openings
2. Increasing fraction of "O&O" stores
3. Growth in same store sales[22] and thus revenue per store type.

Although these parameters have demonstrated great at explaining Pandora's historical growth, it does not necessarily mean that this will be the optimum way to forecast the revenue. If this is an appropriate and logical way to forecast, it must to some degree be supported by Pandora announced targets for these parameters in the future and that Pandora has been realistic in their previously published targets.

8.1.1.1 Store openings

In Table 14 it is clear that Pandora has met their expectations for shop openings historically. Further it shows that Pandora has been a bit conservative in their forecasts and the track-record has proven Pandora is mature enough to open up to 400 concept stores per year, which is quite an achievement.

Table 14 – Announced and Realized Concept Stores Openings

Year (t)	Announced (t-1)	Realized (t)	Bias
2016	>250	325e (Q3)	75
2015	>300	392	92
2014	>175	310	135
2013	≈150	205	55
2012	≈200	223	23
2011	NA	251	-

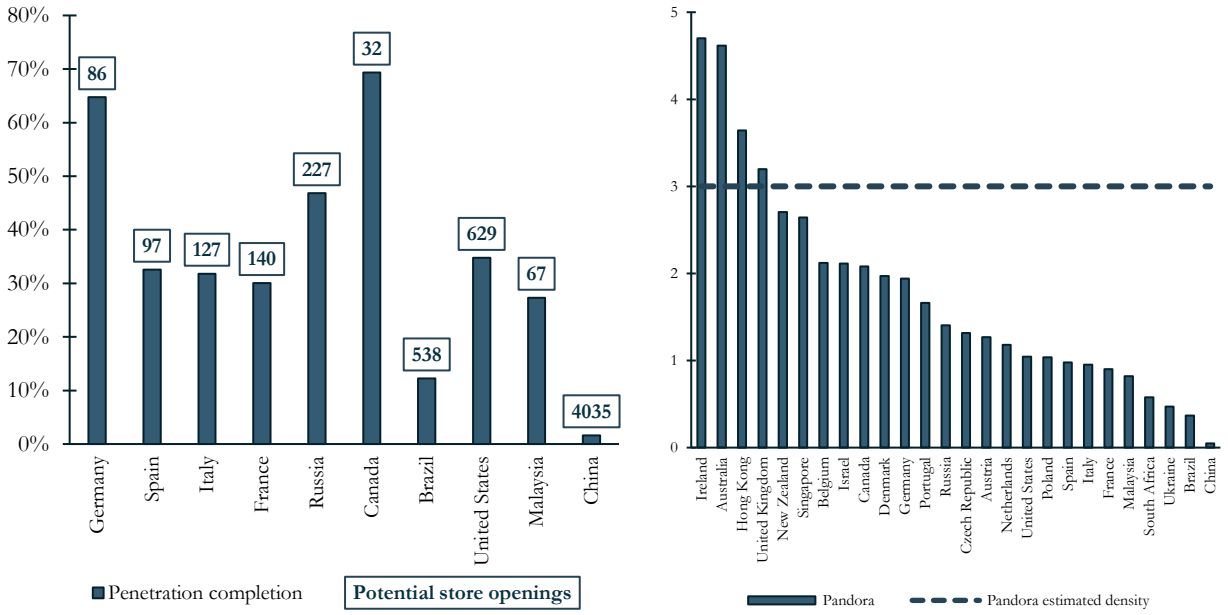
Source: Pandora Annual and Q3 Interim Rapports and own contribution.

Pandora expects to open 200-300 new concept stores annually over the next few years (Berlingske Business, 2016). Offhand this seems a reasonable estimate given the above arguments which can see as a sanity check.

[22] Or as Pandora reports as Like-for-Like sales: Concept stores that have been open for more than 12 months.

Another sanity-check is to look at a more established "affordable" retailer and compare it to Pandora's present concept stores. The paper finds that such a company could be H&M. Taking a number of concept stores in each country per 1 million inhabitants the paper finds that H&M has an average "density" of 4 concept stores per 1 million inhabitants whereas Pandora has an average density of 1.8. Very interesting, it can be seen that in countries Pandora has the highest density in, they pretty much spot on with H&M's density. This figure can be seen in Appendix D. This is illustrated in Figure 16 where the right figure shows Pandora density in different countries, and to the left figure, shoes the potential concept store openings in selected countries based on their density. The potential shop open entries where a conservative estimate of density against 3 H&M density of 4. This indicates 1,500 potential concept store openings in Europe and North America alone. Consequently, the paper finds it realistic to predict 300 concept store openings the next two years, and a decrease in 50 concept stores annually after that.

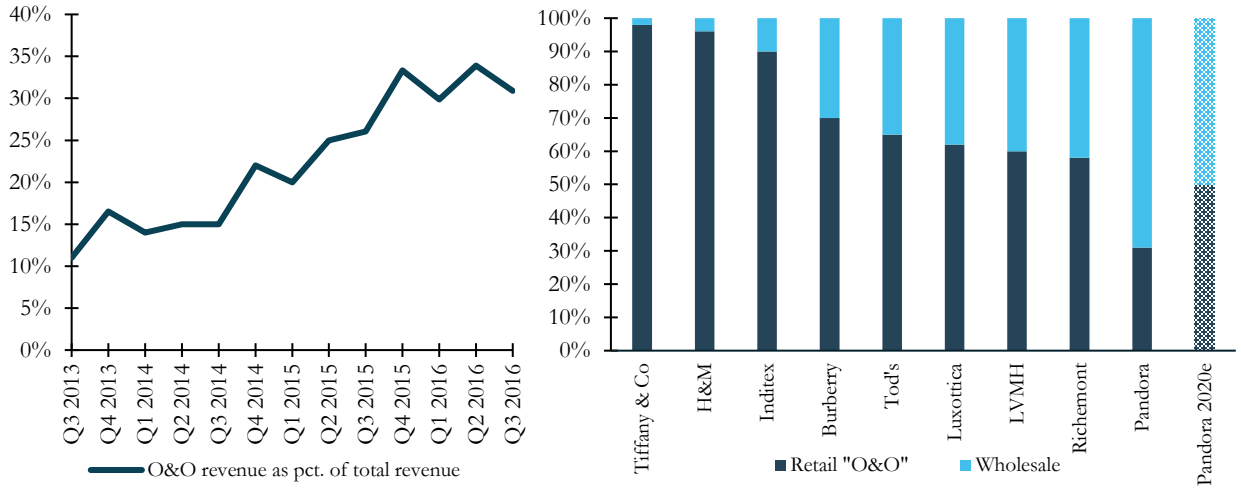
Figure 16 – Left: Penetration completion based on estimated density. Right figure shows concept stores per 1. M inhabitants



8.1.1.2 O&O and Franchise Development

Throughout the explicit forecasting period Pandora is expected to increase the fraction of O&O shops. There as several reasons why the paper found this as this realistic, even though Pandora don't explicit have set goals for this. Firstly, there has been a clear trend in the last three years where Pandora has increased its revenue from O&O where the revenue from approx. 10% to 30% which is supported by increasing fraction of O&O stores and increasing revenue per store in O&O stores. Secondly, because there is a good strategic reason for Pandora to own and operate a higher fraction of its stores as Pandora doesn't have to give a revenue cut to retailers and therefor gets a better margin on these shops. Furthermore, Pandora gets a nicer control over its shops, which is very important to maintain and improve their brand. The fact that Pandora takes this seriously was illustrated as late as in October 2016 when it was revealed that Pandora dropped collaboration with 600 stores, as they did not meet Pandora's branding requirements (Pandora svinger øksen over 600 forhandlere, 2016). Finally, the

higher retail fraction is seen in several high brand retailers which can be seen in the figure below. The paper has set the revenue from O&O shops to 55% in 2020 from the current level which counts for approx. 30% which is still conservative compared to its peers.



Source: Company Data and Bloomberg

The explicit revenue modelling can be found in Appendix D.

8.1.1.3 Revenue per store category

This is based on the growth within the market estimated by McKinsey and the outlook for the jewelry industry as a whole. Furthermore, it is based on the historical revenue per store category, and so the effect from the two value drivers is modeling into the historical development of revenue per store category. Gross Margin

The modelling of gross margin is based on the price of commodities. The paper assumes that the selling prices will remain constant in the forecasting period, i.e. increasing input prices will not affect the price and will therefore weaken the gross margin. This is argued and analyzed in the strategic analysis. The paper has chosen to use Pandora's historical gross margin as a base for the forecasted gross margin, with the average purchase prices on gold and silver. With a weight of 90% input on silver and 10% gold, the gross margin used adjusted to changes in commodity prices, based on futures (Carnegie, 2016). The reason why the annual wage development for the Thai jewelers is not adjusted is because of the expected wage increases is 1.8% which should be very close to inflation, and therefore has no margin impact. The motivation for using the often highly criticized futures for forecasting relies in the paper by (Reeve & Vigfusson, 2011). The main results from the article is that future prices for forecasting purposes generally outperformed a random walk forecast, but not by a large margin. Further, the article shows that both futures and a random walk noticeably outperform a simple extrapolation of the recent trends (random walk with a drift).

The base margin is therefore based on the historical gross margin with respect to the historical commodity prices and the development in the franchise and O&O shop share. Specifically, the base margin is based on the historical base margin adjusted for commodity prices, it has been done in respect to Pandora's rolling hedging strategy and the development I O&O. This ends up with an assumption the base gross margin is 85% for O&O

shops and 69% for franchise stores. Note that the development of O&O share was highlighted in section 8.1.1.2. It is seen from Table 15 that gross margin is expected to weaken over it explicit forecast. This is due to the increase in commodity prices (based on futures prices).

Table 15 – Gross Margin Forecast

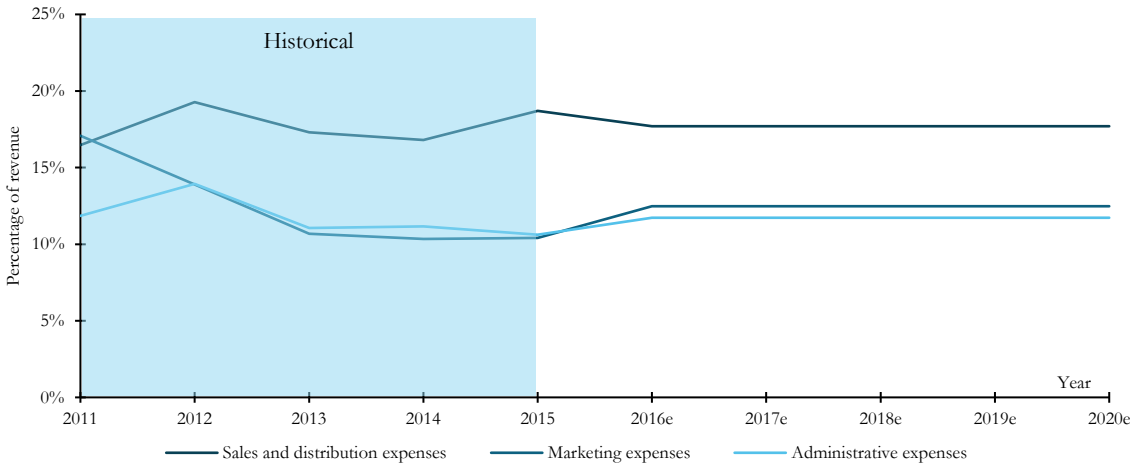
Gross margin	**2016e**	**2017e**	**2018e**	**2019e**	**2020e**
Revenue	20,641	28,509	34,072	39,861	46,070
Cost of goods sold					
Franchise %	0.70	0.66	0.61	0.56	0.50
O&O %	0.30	0.34	0.39	0.44	0.50
"Base" Gross Margin	0.74	0.74	0.75	0.76	0.77
Gold price effect (NW)	-9.4%	2.1%	2.8%	4.3%	6.4%
Silver price effect (NW)	4.6%	11.2%	12.4%	10.0%	15.8%
Jeweler Wages (Thailand) (NW)	1.8%	1.8%	1.8%	1.8%	1.8%
"GSJ" effect (W)	3.2%	10.3%	11.4%	9.5%	14.8%
"Adj." Gross Margin	70.6%	64.2%	63.8%	66.6%	62.2%

Source: Own Contribution

8.1.2 Operating Expenses

Operating expenses includes Sales, distribution, marketing and administration. It is no law of nature that marketing expenses develop in the same proportion as revenue, on the other hand distribution tend normally to fluctuate with revenue. Whereby one can conclude that Pandora's management has chosen to create a link between marketing expenditures and sales. This is also consistent with the findings of the strategic analysis and Pandora's objective to continue strengthening their brand, as Figure 17 shows a very strong link in between the all operating costs to revenue. A simple average of the sales, distribution and marketing expense from 2011 to 2015 is therefore used for forecasting. The same method applies for the administration and distribution expense.

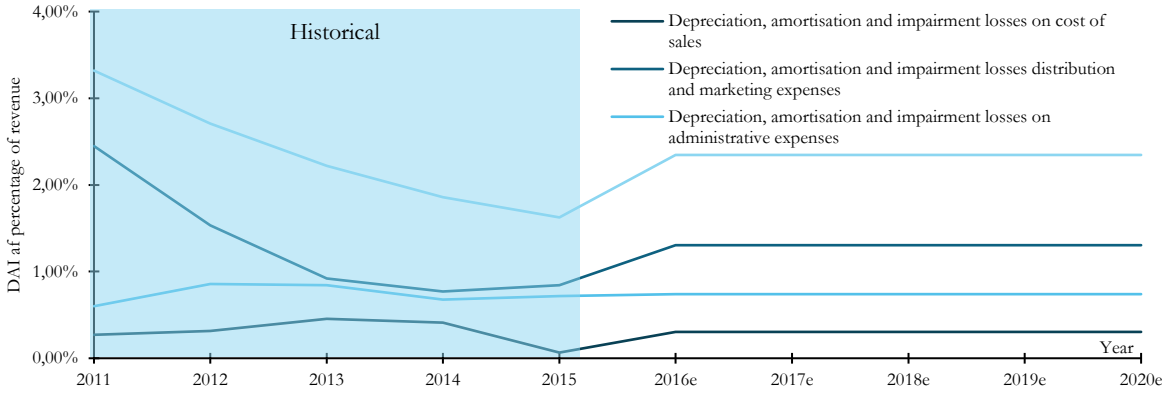
Figure 17 – Historical and forecasted development of operating expense items



Source: Own contribution

8.1.3 Depreciation

Since the costs follows the revenue the paper assumes that the relative depreciation, amortization and impairment losses to the relative components does this as well. The increasing investments in buildings because of increasing the fraction of O&O is reflected in the revenue, and thus don't have to be adjusted in the depreciations margins.



8.1.4 Balance

The forecasted balance sheet can be seen in Table 16. The assumptions regarding the most important figures on the balance sheet will be dealt with in separate points.

- **Inventories:** From the table, it is clear that Pandora has improved their inventories management significantly, which also was highlighted in the financial statement analysis. In 2014 and 2015 inventories seems like inventory has found a "steady" state fraction of revenue of around 14%. This margin is therefore assumed in the explicit forecast.
- **Property, plants and equipment:** An average of the investigated period has been used for the forecasting as fraction of revenue has been rather constant.
- **Trade receivables:** This figure as percentage of revenue has shown an impressive down turn. The forecasting is there based on the last three years, as it looks like it has stabilized around 9% in this period.
- **Trade Payables:** This has shown a constant improvement in the investigated period, as Pandora has improved their credit conditions. Based on mark to marked approach the paper finds a 10% of revenue seems as a reasonable estimate in the forecasting period.
- **Other NOA:** The remaining posts which drives NOA is set to 24%, which stops the downward trend, but doesn't assume that it will be higher in the forecasting period.

Table 16 – Balance Forecast

Balance figures	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Revenue	6,658	6,652	9,010	11,942	16,737	20,154	28,867	34,808	41,189	48,218
Inventories	1,609	1,318	1,490	1,684	2,357	2,840	4,067	4,904	5,803	6,793
% of revenue	*24.2%*	*19.8%*	*16.5%*	*14.1%*	*14.1%*	*14.1%*	*14.1%*	*14.1%*	*14.1%*	*14.1%*
Property, plants and equipment	429	472	497	711	1,237	1,306	1,871	2,256	2,669	3,124
% of revenue	*6.4%*	*7.1%*	*5.5%*	*6.0%*	*7.4%*	*6.5%*	*6.5%*	*6.5%*	*6.5%*	*6.5%*
Trade receivables	900	940	895	1110	1360	1,838	2,632	3,174	3,756	4,397
% of revenue	*13.5%*	*14.1%*	*9.9%*	*9.3%*	*8.1%*	*9.1%*	*9.1%*	*9.1%*	*9.1%*	*9.1%*
Trade payables	288	219	539	804	1,329	1,814	2,887	3,481	4,119	4,822
% of revenue	4%	3%	6%	7%	8%	9%	10%	10%	10%	10%
Other NOA	3,280	3,581	3,916	3,584	4,252	4,837	6,928	8,354	9,885	11,572
% of revenue	49.3%	53.8%	43.5%	30.0%	25.4%	24%	24%	24%	24%	24%
NOA	5,930	6,092	6,259	6,285	7,877	9,007	12,611	15,207	17,994	21,065
% of revenue	89%	92%	69%	53%	47%	45%	44%	44%	44%	44%
ATO	1.1	1.1	1.4	1.9	2.1	2.2	2.3	2.3	2.3	2.3

Source: Own contribution.

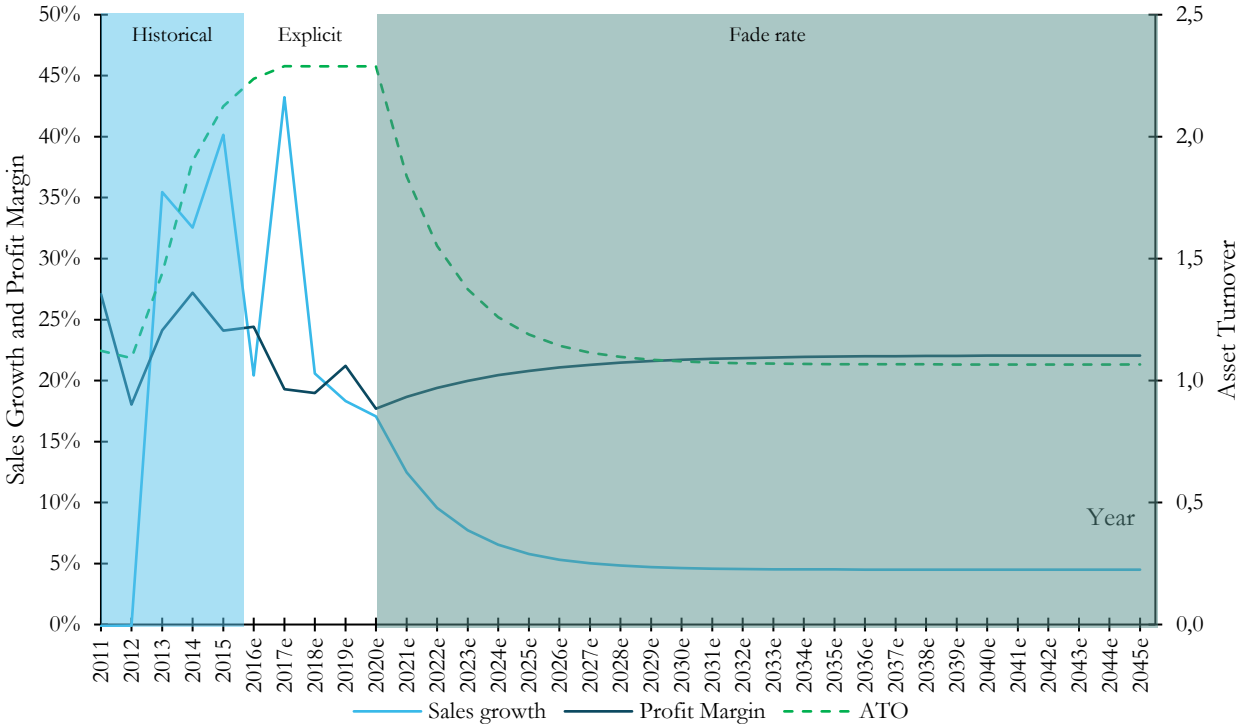
8.2 FADE RATE PERIOD

The fade rate period starts after the explicit forecasting period. The fade period is driven by the value drivers long-run industry level a and the value driver's persistence ω, which was estimated in the quantitative industry analysis. To implement the two components for each value driver, the paper uses the following formula

$$E_t(X_{t+h}) = a + \omega^h(X_t - a)$$

where X is the selected value driver. Dependent on the persistence and the difference from the ending value driver value in the explicit forecasting, to the long-run level, we can see in Figure 18 how long time it takes for each value driver to converge to their long run levels.

Figure 18 – Development of ReOI Value Drivers



Source: Own contribution.

9 TERM-STRUCTURE OF INTEREST RATES

Both valuation methods should be discounted with an appropriate interest rate under the time horizon. The term-structure of interest rates can be determined either using a static or a dynamic interest rate model. With foundation from (Bliss, 1996)[23] a static term-structure of the interest rates will be forecasted using the Extended Nelson-Siegel Model. The reason why the paper chose this method rather than the Smoothed Fama-Bliss method is that the Nielson Siegel method seems more used in practice, i.e. (European Central Bank, 2016) why the method seems acknowledged. Given Pandora's expected growth in coming years and therefore relatively "high" proportion equity value from these years; the paper finds it important to use resources to estimate the term structure, with the current low interest rate taken into account. In addition, the interest rate structure is used to calibrate parameters for the GE-valuation. The data used for the analysis can be found in Appendix E

9.1 THE EXTENDED NELSON-SIEGEL MODEL

As mentioned above the Extended Nelson-Sigel Model will be used for the estimation of the term-structure. The extended version of the original model is proposed by (Svensson, 1994). The "not extended" model purposed by (Nelson & Siegel, 1987) assumed that the instantaneous forward rate was the solution to a 2nd order differential equation with two equal roots. The original model for the forward rate can be written as

$$f(m;b) = \beta_0 + \beta_1 \exp\left(-\frac{m}{\tau}\right) + \beta_2 \frac{m}{\tau} \exp\left(-\frac{m}{\tau}\right)$$

where m is maturity and $b = (\beta_0, \beta_1, \beta_2, \tau)$ is a vector of constant parameters where β_0 and τ must be positive. The three betas allow the term structure to make one hump. (Svensson, 1994) found this inflexible and unfit and therefore added two parameters which allow for a second hump in the term structure. The Extended Nelson-Siegel Model instantaneous forward rate is written as

$$f(m;b) = \beta_0 + \beta_1 \exp\left(-\frac{m}{\tau}\right) + \beta_2 \frac{m}{\tau} \exp\left(-\frac{m}{\tau}\right) + \beta_3 \frac{m}{\tau_2} \exp\left(-\frac{m}{\tau_2}\right)$$

where m is maturity and $b = (\beta_0, \beta_1, \beta_2, \tau_1, \beta_3, \tau_2)$ is a vector of constant parameters where β_0 , τ_1 and τ_2 must be positive. As the instantaneous forward rate is the interest rate between inisitesmal clase future dates, integration of the instantaneous forward rate yeilds the spot rate.

$$r(m;b) = \frac{1}{m}\int_0^m f(x;b)dx$$

With this derived, the spot rate for the 6-parameter Extened Nielson-Siegel model can be written as

$$r(m;b) = \beta_0 + \beta_1 \frac{1-\exp\left(-\frac{m}{\tau_1}\right)}{\frac{m}{\tau_1}} + \beta_2 \left(\frac{1-\exp\left(-\frac{m}{\tau_1}\right)}{\frac{m}{\tau_1}} - \exp\left(-\frac{m}{\tau_1}\right)\right) + \beta_3 \left(\frac{1-\exp\left(-\frac{m}{\tau_2}\right)}{\frac{m}{\tau_2}} - \exp\left(-\frac{m}{\tau_2}\right)\right)$$

[23] "Users seeking a parsimonious representation of the term structure should consider either the Smoothed Fama-Bliss or the Extended Nelson-Siegel methods." (Bliss, 1996)

From the expression, it's seen that β_0 can be seen as the long-run interest rate as the remaining three betas "disappears" as the maturity increases, $\lim_{m\to 0} r(m;b) = \beta_0$. Additionally $\beta_0 + \beta_1$ can be interpreted as the short-term interest rate, $\lim_{m\to 0} r(m;b) = \beta_0 + \beta_1$. The third and fourth term in the model express the humps in the term-structure of interest rates and the parameters $\beta_2, \beta_3, \tau_1, \tau_2$ determine the shape, sign and location of the humps. The contribution of each term can be seen in Appendix E. Before jumping to the estimation the paper will briefly explore the theory of bond pricing, as this is a prerequisite for using the model correctly.

9.2 BOND PRICING

The value of a bond can be calculated as the sum of the value of the cash flows at each payment date[24]. Therefore, the bond price will follow a linear relation of

$$P_j = \sum_{m=1}^{M} C(m,j)\exp\big(-m \cdot r(m)\big)$$

where j is the bond, $C(m,j)$ is the cash flow from bond j at time m, and $r(m)$ is the appropriate continuous interest rate at time m. If P_j^* denotes the estimated theoretical bond value of bond j, the pricing relation can be written as

$$P_j^M = \sum_{m=1}^{M} C(m,j)\exp\big(-m \cdot r(m;b)\big) + \epsilon_j = P_j$$

where P_j^M is the observed market price of bond j, $r(m;b)$ is the estimated interest rate and ϵ_j is the error term. Consequently, the six parameters in the Extended Nelson-Siegel Model can be estimated by minimizing the obtained pricing errors

$$\hat{b} = \min_b \epsilon^2$$

where ϵ is the sum of squared residuals of $N < M$ bonds.

9.3 DATA AND METHODOLOGY

As seen in section 4.4 the regional distribution of institutional shareholders is quite well distributed, between Denmark, UK and North America, which suggest no clear obvious risk free alternative. Assumed the maturity of the retail investors is Danish investors, and the fact that choosing other bonds than Danish Government bonds will imply currency risk considerations[25], the paper finds that Danish government bonds should make the basis for the interest rate term structure.

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[24] The Fundamental Theorem of Asset Pricing (BRUG NORSK BOG)

[25] Pandora's financial statements are denominated in DKK.

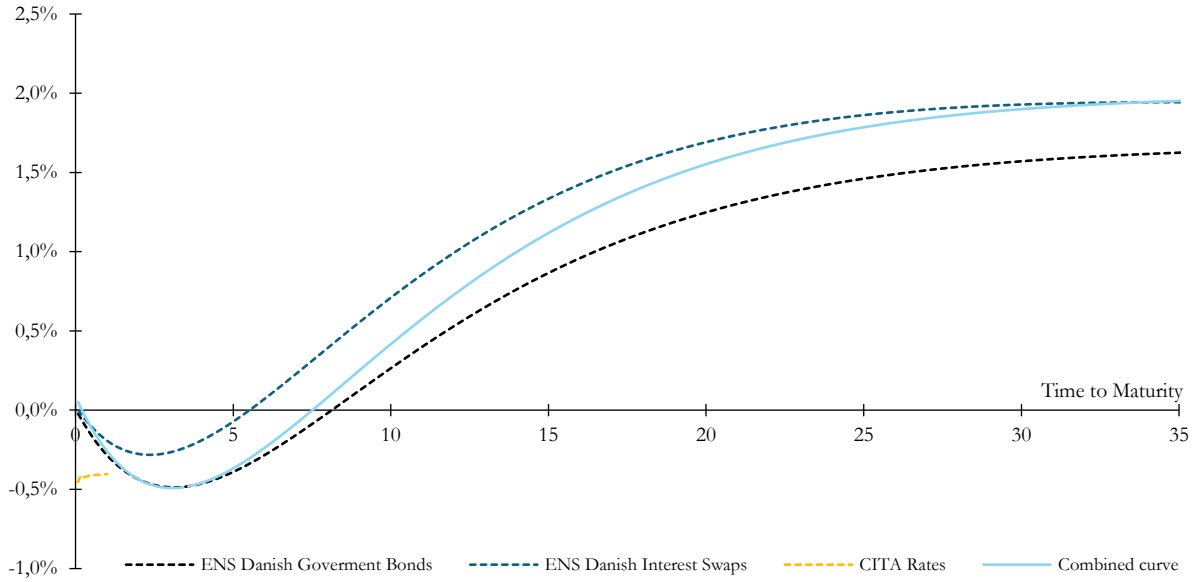
As of November 17th 2016 there are 9 Danish government bullet bonds listed (Nasdaq, 2016). One of these bonds, is an inflation index-linked bond, and its therefore excluded from the sample, as this will imply assumptions regarding inflation. Since there is a bullet bond with the same maturity, the paper considers it unproblematic to remove this bond. The maturity of the reaming 8 bonds is from 1 to 23 years. 7 of these bonds has maturity from 1 to 9 years where the last bond has maturity 2039. Hence, the maturity of the bonds with maturity from 1 to 9 years are significantly more liquid (L.P. Bloomberg, 2016). With inspiration by (Ron, 2016) the paper therefore choses to split the parameter estimation into three parts, since the government bonds only are liquid from 1 to 9 years.

The short end of the curve (12 months) is therefore based on the observed CITA[26]-rates. CITA rates are derived from a short interest rate swap with the T/N-rate as the variable rate. The zero coupon CITA rates are easily observed for 1, 2, 3, 6, 9 and 12 month, and is quoted daily with three decimals by seven banks[27] (Finansrådet, 2016). The middle area of the curve is based on Danish government bonds, as these are most liquid for this area. For the long end of the yield curve, the paper will use the liquid Danish swap rates as suggested by (Ron, 2016). The swap rates are generic plain vanilla interest rate swaps with fixed rates exchanged for floating interest rates. The fixed leg of the Danish interest swap rates is quoted on a daily basis[28] with annual maturities from 1 to 10 years and 12, 15, 25 and 30 years of maturity, against the 6-month CIBOR floating interest rate (Finansrådet, 2016). The fixed rate of the interest rate can be treated as a bullet bond traded at par (Hull, 2012).

Since the short, middle and long end of the curve won't fit perfectly together, the term structure has to be smothered (Ron, 2016). The smothering of the 3 curves is also done based on the Extended Nelson Siegel Model. Based on the maturity of the three factors, the observed CITA rates are used for maturities up till one year, the estimated zero coupon rates for the Danish Government Bonds are used for maturities from 1-9 years and the estimated zero-coupon rates for the Danish swap rates are used for maturities longer than 9 years. Figure 19 shows the estimated curves for the Danish government bonds and the Danish interest swap rates, and the observed CITA rates; and finally, the combined curve.

[26] CITA - Copenhagen Interbank Tomorrow/Next Average.
[27] CITA reporting banks: Danske Bank, Jyske Bank, Nordea Bank, Nykredit Bank, SEB, Sydbank and Spar Nord Bank.
[28] All "bank day's" at 11.00 am.

Figure 19 – Combining the short, middle and long end of the term-structure interest rates



Source: L.P. Bloomberg and own contribution

The combined curve does not really capture the CITA fixing perfectly, but fits the government bond line quite well the first 5-6 years where it is pushed upwards to hit the swap rate. Unfortunately, this is inevitable, as you want a smooth line, and there is a significant spread between the two estimated curves.

Table 17 shows the estimated parameters for the combined curve. From the table we get that β_0 is 1.92% which is the long run level of the interest rate. However, the Swap rate curve reaches its peak at 1.94% at 35 years to maturity, hence the interest rate is assumed to be constant at 1.94 for maturities greater than 35 years.

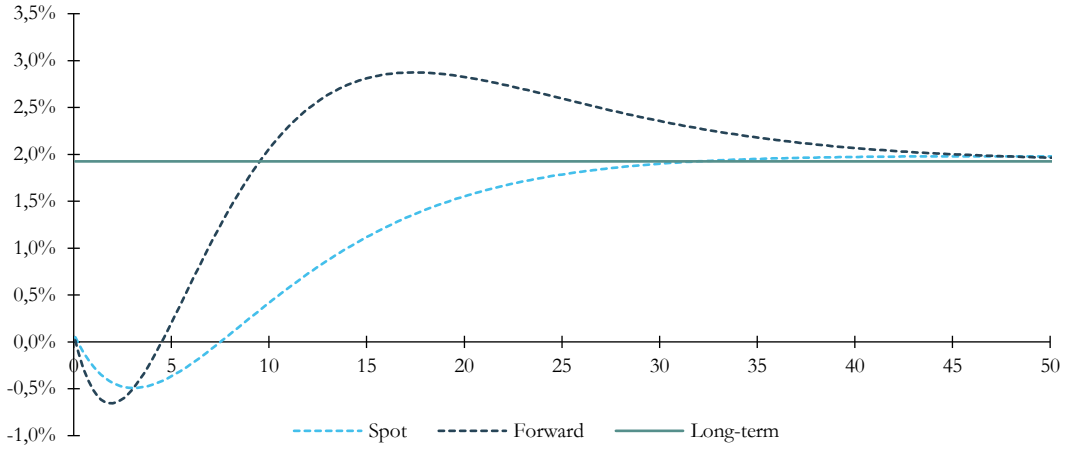
Table 17 – Extended Nelson Siegel Parameters for Combined Curve

Parameters	**β_0**	**β_1**	**β_2**	**β_3**	**τ_1**	**τ_2**
Estimate	0.0192	-0.0184	-0.2592	0.2352	5.0586	6.0968

Source: L.P. Bloomberg, Nasdaq and own contribution.

In Figure 20 the long run level is showed with the spot and the forward rates. The forward rates will be used in the ReOI modelling.

Figure 20 – Risk free spot, forward and long-term rates



Source: L.P. Bloomberg and own contribution

10 FIRM COST OF CAPITAL

With the interest-rate term structure estimated, the paper will now estimate Pandora's cost of capital as it is necessary in order to implement the ReOI model which were introduced in section X. With the assumption that the risk premium is constant and the same in all future periods and relying on Brennan and Xia (2003), the paper defines a term-structure of the firm cost of capital as:

$$R_{\tau,t}^{F} = e^{\iota_{\tau,t}} \cdot e^{RP_F}$$

Where $\iota_{\tau,t}$ is the continuous zero coupon interest rate at time t with maturity at time τ. RP_F is the firm specific constant risk premium. In the following sections the term structure of interest rates and forward rates are estimated and the risk premium will be determined by the firm beta and choosing a reasonable risk premium. Finally, the firm cost of capital for Pandora is determined.

The risk premium for Pandora consists of two parts. The firm specific beta and the market risk premium and it is written as

$$RP_F = RP_M \beta^{Firm}$$

where RP_M is the market risk premium and β^{Firm} is the firm specific Beta. In order to determine a risk premium for Pandora the two parts of the risk premium will be estimated in the following sections.

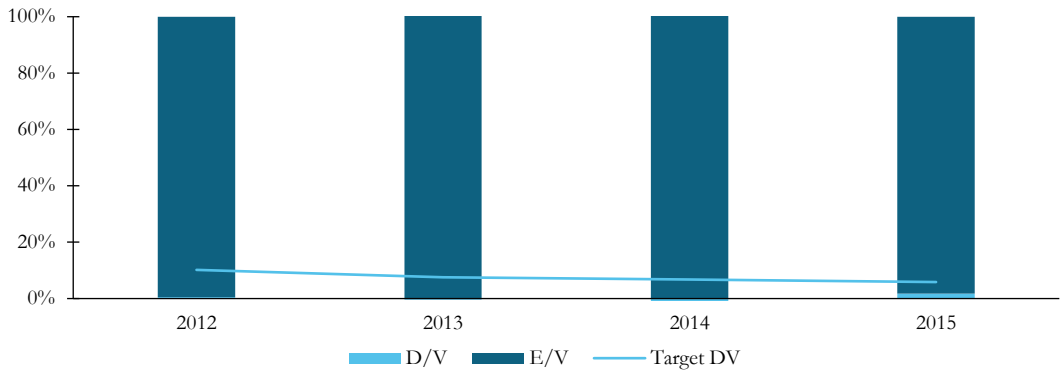
10.1 CAPITAL STRUCTURE

In order to determine the firm specific beta (β^{Firm}) it has to be broken down into two parts, i.e. Beta Equity $\left(\beta^{Equity}\right)$ and Beta Debt $\left(\beta^{Debt}\right)$ since it is not possible to observe the firm beta. Specifically, the firm specific beta is given as

$$\beta_t^{Firm} = \beta_t^{Equity} \frac{E_t}{V_t} + \beta_t^{Debt} \frac{D_t}{V_t}$$

Where E_t is the market value of equity, and D_t is the market value of the debt, at time t. Consequently, three components need to be determined, i.e. beta equity, beta debt, and the ratio of debt and equity to the enterprise value. In order to find a reasonable level for two ratios the paper will consider the development of $\frac{E_t}{V_t}$ and $\frac{D_t}{V_t}$ from the last four years, and the company forward target structure. Historically, Pandora has had low gearing as seen in Figure 21. This is also covered in the Financial Statement Analysis. Pandora has a very conservative financial policy, which consists of a target capital structure of maintain a $\frac{NIBD}{EBITDA}$ in the interval of [0;1] which historically would had been a $\frac{D}{V}$ at a maximum of 10 %, given the historically firm profitability. However, in reality Pandora operated entirely at the bottom of their target range, but with slightly higher borrowing in the last two years, with a $\frac{NIBD}{EBITDA}$ of 0.26. The paper finds it realistic that the trend of slightly higher borrowing will continue towards the center of the target capital structure which will be $\frac{D}{V}$ of 0.05.

Figure 21 – Historical Capital Structure



Source: Pandora Annual Rapports, Bloomberg and own contribution.

10.2 Equity Beta

In order to determine the equity cost of capital, the thesis uses the standard asset pricing model CAPM. The used approach has to allow a time-varying risk free interest rate (Christensen and Feltham, 2009), which where estimated in section X. Consequently, the equity beta can be estimated using the following regression

$$RE_\tau - \iota_\tau = \alpha_t^{Equity} + \beta_t^{Equity}[RM_\tau - \iota_\tau] + \epsilon_\tau, \tau = s, s+1, \dots, t-1$$

where RE_τ and RM_τ are the observed returns in period τ on the stock and the market index proxy, respectively and ι_τ is the risk free interest rate.

The use of the CAPM model rises concerns to a set of problems. First problem is to consider the choice of the proxy for market portfolio. Another critical aspect of the model is that is only valid in a multi-period setting if the investment opportunity set deterministic[29] or investors have log utilities (Christensen and Feltham, 2009). The last problematic issue is that the equity beta is constant over time, i.e. with constant leverage ratio in the estimation period. The paper will look at the realism of these assumptions in line with the analysis is being made, to obtain an illustrative picture of the issues. Although the model is based on a set of critical assumptions, the model will be used to estimate β^{Equity} using a 6 years data[30]. For the market portfolio proxy four marked indexes will be considered, i.e. MSCI[31] World, MSCI Europe, KaxCap and MSCI World All Countries[32]. For each market portfolio proxy, a meaningful (in terms of geography) corresponding 3-month interbank rate will be used as a variable for the risk free interest rate. Total returns are calculated using log-returns, where data is extracted from DataStream. With recommendation from (Hull, 2012) data frequency is chosen to be one week to eliminate possible microstructure effects of high-frequency data, i.e. here especially autocorrelation, and still obtaining a large sample.

[29] The riskless return and the Sharpe ratio is non-stochastic, i.e. the slope on the capital market line.
[30] From IPO date till 11-11-2016.
[31] Morgan Stanley Capital International.
[32] MSCI World All Countries also contains non-developed countries, where MSCI World only contains developed countries.

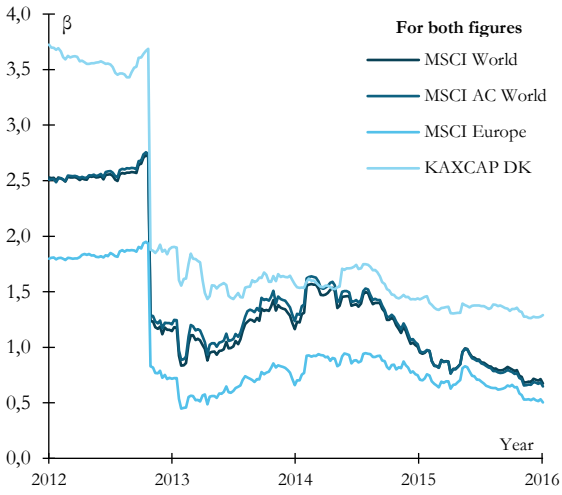
Table 18 – Equity Beta Estimation

Index	Interbank Rate	α	β		Adj. α	Adj. β	
MSCI World	LIBOR	0.085648	1.774074	***	0.354115	1.039471	***
MSCI AC World	LIBOR	0.106084	1.769277	***	0.367629	1.053076	***
MSCI Europe	EURIBOR	0.191329	1.281619	***	0.350744	1.050554	***
KAXCAP DK	CIBOR	-0.121013	2.350759	***	0.184354	1.672907	***

* 10% significance level, ** 5% significance level and *** 1% significance level (only conducted for Betas)
Source: DataStream, own contribution

From Table 18 the essential information from the different regressions is typed. From the table it is clear that α's is very insignificant whereas the β's seems robust. The adjusted α and adjusted β refers to the same regression where ***one*** observation is deleted from of the dataset. The observation is 5 August 2011 where Pandora share price dropped 67% and the MSCI World Index dropped 9%. The extreme drop in Pandora's share price came just when Pandora announced a sharp downgrade of future sales expectations for the financial statements (Berlingske Business, 2011). This strongly indicates that the drop in the share price was not solely correlated with the drop in the market portfolio proxy. The paper has therefor found it relevant to show the immense impact from this correlation. Taking a look back at Table 18, it can be seen that the β's for MSCI World is 1.77 and 1.03, where only one observation separates the two regressions. The observation also effects the stationary of β significantly, which can be seen in Figure 22. The graph on the left shows the raw regression, where there is a clear drop in the betas as the observation "slips out" from the two year rolling regression. In the adjusted two year rolling beta estimation, we see a "more" stationary beta, although the stationarity is not impressive, and the β's for each market proxy typically goes around 0.5 beta value.

Figure 22 – 2 Year Rolling Equity Beta



Source: DataStream and Own Contribution

Figure 23 – Adj. 2 Year Rolling Equity Beta

Source: DataStream and Own Contribution

To determine the equity beta, the paper could combine the historical betas, features from the button-up method[33], and a comparison with their closest peer. From the strategic analysis the paper found Pandora's products to be purchased with primary discretionary income, thus it is given that Pandora is exposed to economic cycles. Additionally, Pandora's current revenue generation is based on its charms assortment. Therefore, it could be argued that the beta should reflect more systematic risk and thus a beta higher than one. Tiffany & Co.´s beta is estimated to be 1.88 (L.P. Bloomberg, 2016) which suggests that a company like "Pandora" should have a high beta. So even though the paper could argue that the "outlier" should be removed from the regression given it is associated with a historical company announcement, one cannot neglect that the beta still should effect the 9% market drop. Consequently, the paper chooses the non-adjusted beta, and uses the MSCI World Index as it matches the fact that Pandora has investors from the whole world, however, with primary share capital in developed countries (therefor not the MSCI World AC). The base-case equity beta is therefore 1.77, although it is associated with high uncertainty. The analysis of the equity beta, and its sensitivity to single observations, provides motivation for a great focus on beta in the sensitivity analysis.

10.3 DEBT BETA

In the section the debt beta is to be found. It is often assumed by practitioners and in literature that the debt beta is equal to zero. Given Pandora's low debt level, this will probably be a sensible assumption as the debt has a very limited weight on the firm beta. Evidence shows however, the corporate debt rarely equals zero. Although it clearly has a lesser importance to estimate Pandora's debt beta than for more levered company, the paper however finds that it's important to be consistent in using the most sophisticated methods in the valuation, as the paper will hopefully be motivation and inspiration for future valuations and in equity research in general.

The assumption regarding debt equals zero, is based on reasoning of when the market moves down, the credit risk on the corporate bond increases which decreases the value of the bond. Nevertheless, given the correlation between the interest rates and the markets has a positive correlation, a decrease in interest rates causes an increase in the value of the bonds. But if the debt beta in fact is positive, an assumption on beta equal zero will lead to an upward bias in the valuation. The paper therefore wants to estimate the debt beta, to eliminated this possible bias.

First challenge is that Pandora has no listed bonds. In order to run a regression similar with the equity beta estimation, the paper needs to finds an appropriate proxy for Pandora's debt. This can be challenging since one does not know the true risk of Pandora's debt. The paper has chosen to address this issue by an estimate for Pandora's debt credit rating, using a commercial retail credit rating framework from Moody's Corp. The framework takes multiple aspects into consideration, i.e. business, scale, business profile, leverage, coverage and financial policy. With a credit rating estimated, it is possible to use a traded index with the same creditworthiness as a proxy, and run a similar regression as in the equity beta.

[33] The bottom-up method is based on the company's fundamentals (Damodaran, Estimating Risk Parameters, 2016)

Based on the Moody's framework the paper has estimated that Pandora's credit rating is A1. The full framework and analysis is to be seen in Appendix F. Based on this rating, a single-A Euro industrial index[34] is used as a proxy to run the beta regressions. The results from the regressions can been seen in Table 19.

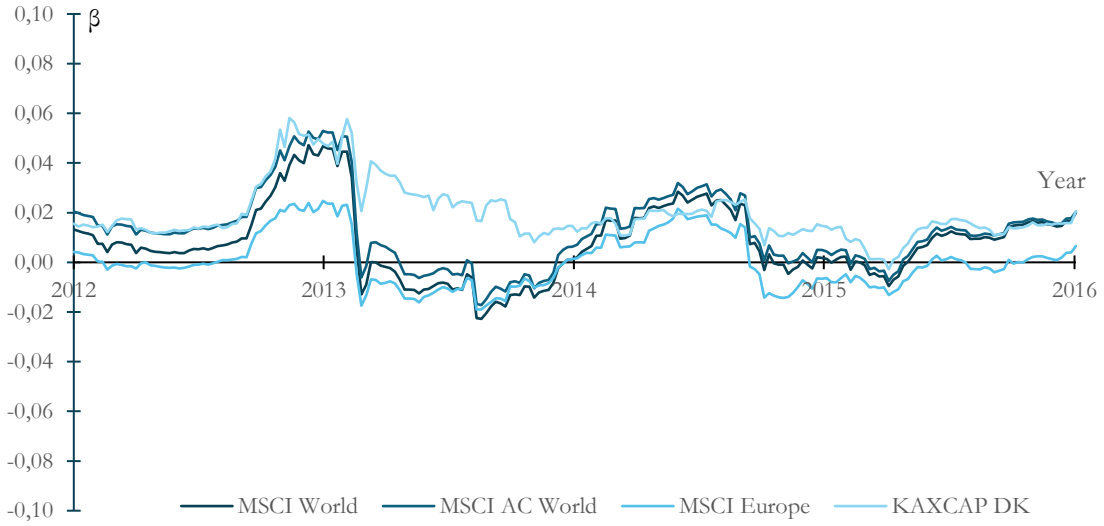
Table 19 – Debt Beta Estimation

Index	Interbank Rate	α	β	P-value (β)
MSCI World	LIBOR	0.038320	0.011944	0.258133
MSCI AC World	LIBOR	0.038224	0.017354	0.098240
MSCI Europe	EURIBOR	0.039001	0.004310	0.602576
KAXCAP DK	CIBOR	0.038523	0.017941	0.076897

Source: DataStream, own contribution

From the table above we can see that all estimated debt betas are slightly positive. The calculated P-vales for the betas however, show that we cannot reject statistically that the betas are equal to zero with a 95 percentage confidence interval. As in the equity beta estimation, a beta estimation using a two-year rolling window is conducted for the debt beta. The beta development can be seen in Figure 24 that is quite stable around zero, although it is more "positive" than "negative" on the 6 year estimated period. Therefore, it makes sense that the estimated beta value is slightly positive. The paper therefor choses to use estimated debt beta estimated on the MSCI World index, i.e. $\beta^{Debt} = 0.0119$.

Figure 24 – 2 Year Rolling Debt Beta



[34] The BofA Merrill Lynch Single-A Euro Corporate Index (Non-financial)

10.4 FIRM BETA

Finally, β^{Firm} can be calculated using the estimated values for the parameters β^{Equity}, β^{Debt}, $\frac{E}{V}$ and $\frac{D}{V}$. As expressed in section 10.1, β^{Firm} can be calculated with the following expression:

$$\beta_t^{Firm} = \beta_t^{Equity} \frac{E_t}{V_t} + \beta_t^{Debt} \frac{D_t}{V_t}$$

$$\beta_t^{Firm} = 1.77 \cdot 0.95 + 0.12 \cdot 0.05 = 1.69$$

10.5 MARKET RISK PREMIUM

The market risk premium is a measure for the risk in the market portfolio; the excess return investors require to that on that specific risk. The market risk premium is not something you can immediately observe. Similarly, there is no standard method, but on the other hand against several ways to estimate it. Dr. Damodaran from Stern School of Business has allocated much of his research on this topic and continuously updates on the market risk premium on his own homepage (Damodaran, Damodaran Online, 2016). Dr. Damodaran suggest three methods to estimate market risk premium.

- Survey Approach
  This method uses a survey approach, where professors, finance professionals and investors are asked on their view on the market risk premium.
- Historical difference between market return and risk free rate
  This approach looks at historical market returns and subtract the risk free rate in order to determine the market risk premium.
- Implied Market Risk Premium
  This method takes the implied market risk premium, from the current market prices, and therefore is forward looking.

Recent research shows that the risk premium is not dependent on the risk-free interest rates, which there previously has been indications of (Damodaran, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 Edition, 2016). This indicates a weakness of the historical method. Further the method is very sensitive to the chosen estimation period (Christensen and Feltham, 2009). Consequently, the paper has chosen not to consider the historical method. From Table 20 the key survey results from (Damodaran, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 Edition, 2016) showed. This indicates that the market risk premium should be in the interval of [5%;5.6%].

Table 20 – Survey Equity Risk Premiums

Group	Avg. Equity Risk Premium	St. dev. (ERP Estimates)
Academics	5.6%	1.6%
Analysts	5.0%	1.1%
Companies	5.5%	1.6%

Source: (Damodaran, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2016 Edition, 2016)

The implied market risk premium is however estimated by KPMG recently. According to (KPMG International, 2016) its recommended to use an equity market risk premium of 6.0% as per 30 June 2016 using the implied market risk premium method which is a 0.25% point increase from the March rapport. The paper chooses to use this estimate due to only formal knowledge of how the survey estimates have been made and the fact that the interview group might be bias of former "recommended" equity risk premiums, which may have been based on the two "quantitative" estimation methods. Consequently, the market risk premium of 6% is assumed to be constant into the future, which seems as a fair assumption although there have been fluctuations in the market risk premium historically (given the implied method is correct).

10.6 THE FIRM COST OF CAPITAL

Finally, all the parameters are estimated and calculated in order to calculate Pandora's Cost of Capital. First step to do so, is to calculate the firm specific risk premium of Pandora. This given by

$$RP_F = RP_M \beta^{Firm}$$

where the paper chooses the KPMG recommended MRP of 6% and the above calculated β^{Firm} of 1.69 we can easily plug-in the numbers in the formula

$$RP_F = 6\% * 1.69 = \ 10.12\%$$

In section 0 the term-structure of the risk free rate where estimated using the extended Nelson-Siegel model. With the term-structure and the Pandora's risk premium estimated, it is possible to establish a term-structured based of the formula which was stated in the beginning of this section

$$R^F_{\tau,t} = e^{\iota_{\tau,t}} \cdot e^{RP_F}$$

10.7 CONTINUING VALUE

In this subsection the paper will take a closer look at the continuing value specification. The paper has chosen to use two approaches as the quite standard approach is Gordons Growth formula approach often is highly criticized. Objectively, one can say that the calculation of this value is extremely sensitive to a few assumptions. It therefore seems sensible to use market-to-book method also, to have a benchmark

10.7.1 Gordons Growth Model

If the value of all residual operating incomes is determined up until the time (T) of the implementation of the continuing value (CV), the reaming value past the terminal point, can be considered as unrecognized goodwill at time T. The ReOI model can therefore be rewritten as

$$V_t = NOA_t + \sum_{\tau=t+1}^{T} (R^F_{\tau,t})^{-(\tau-t)} E_t[ReOI_\tau] + (R^F_{\tau,t})^{-(T-t)} CV_T$$

Consequently, one need to assume that ReOI grows at a constant rate y, after time T, and the risk adjusted interest rate $R^F_{\tau,t} - 1, \tau \geq T$ is contant after time T. With respect to these assumptions the continuing value based on Gordon's Growth formula can be written as

$$CV_T = \sum_{\tau=t+1}^{\infty} \left(\frac{1+y}{R^F_{\tau,t}}\right)^{\tau-T} E_t(ReOI_T) = \frac{ReOI_T(1+y)}{R^F_{\tau,t} - 1 - y}$$

The continuing value relies on the assumption that $1 + y < R^F_{\tau,t}$ as the continuing value will go to infinity, this is however not a problem in this valuation.

10.7.2 Market-to-Book Ratio

The other approach which the paper will use for the continuing value the fair market-to-book value. Why this ratio can be used as the continuing value can be seen in the following rewriting of the continuing value.

$$CV_T = E_t[V_T - NOA_T]$$
$$CV_T = E_t\left[\left(\frac{V_T}{NOA_T} - 1\right) * NOA_T\right]$$
$$CV_T = \left(E_t\left[\frac{V_T}{NOA_T}\right] - 1\right) NOA_T$$
$$CV_T \cong \left(\frac{E_t[V_T]}{E_t[NOA_T]} - 1\right) NOA_T$$

where $\frac{E_t[V_T]}{E_t[NOA_T]}$ is the expected fair market-to-book ratio. The long-run market-to-book ratio estimated in the quantitative industry analysis which was found to be 2.89 based on the peer group, as the ratio found from the wider sample[35] as very similar.

[35] BICS: Jewelry & Watches Stores

11 ESTIMATION OF GE RISK ADJUSTMENTS

The estimation of GE[36] risk adjustments must now be done, as it is necessary to adjust the ReOI in the consumption-based valuation model. The article (Bach & Christensen, 2013) "*Consumption Based Equity Analysis*" is foundation for the analysis, with minor differences. The differences will be highlighted and argued when relevant. However, the article (Christensen & Feltham, 2009) "*Equity Valuation*" is also used for this section as this article theoretical assumptions of the model whereas (Bach & Christensen, 2013) put more emphasis on the practical implementation of the model. The spreadsheet for calculating the consumption index is in Appendix G.

The model can be formulated as the following

$$\frac{V_t}{NOA_t} = 1 + \sum_{\tau=1}^{\infty} NOA\left[E_t\left(RIR_{t,t+\tau}\right) - Cov_t\left(RIR_{t,t+\tau}, ci_{t+\tau}\right)\right]$$

where $RIR_{t,t+\tau} = \frac{ReOI_{t+\tau}}{NOA}$ From this equation, the paper can estimate the value of Pandora. However, there are three things to be clarified and prepared before the actual estimation can begin.

1. Define and construct a consumption index ci_{τ}^{R}.
2. The risk adjustments which is given by the covariance between residual operating income and the nominal consumption index needs to be computed for all points in time $Cov_t[ReOI_{\tau}, ci_{\tau}^{R}]$.
3. Construct a continuing value when the value drivers and the long risk free interest rate is converged to the respective long-run levels.

11.1 THE CONSUMPTION INDEX

The consumption index for power utility is given as

$$ci_{t+1} = \gamma \ln(c) + \ln(p_{t+\tau})$$

and $\gamma = \frac{1}{\alpha}$ is the relative risk aversion, $c = \frac{\frac{c^N}{p^N} + \frac{c^S}{p^S}}{I}$ where N and S is denoting nondurable and services, respectively and I is the population size[37]. The weighted price index is calculated as $p = \frac{c^N}{c^N + c^S} p^N + \frac{c^S}{c^S + c^N} p^S$. In order to calculate the consumption index per capita, the paper has used data for personal consumption expenditure on *non-durable goods* and *services* from the National Income and Product Account (NIPA) tables which is published by the Bureau of Economic Analysis. This approach is consistent with CCAPM theory and this approach is recommended and used by Bach and Christensen. The paper has chosen the rather standard approach to estimate the relative risk aversion. Although it might have been interesting to go deeper into this parameter, the paper chooses to use the same assumption (Bach & Christensen,

[36] Or CCAPM
[37] Mid-year figures (NIPA)

2013)[38], a relatively risk aversion of $\gamma = 2$. The reason behind this this choice involves not only the scope of the paper, but also to make the final valuation figures comparable. Since this parameter seems like the standard assumption, it seems reasonable.

11.2 RISK ADJUSTMENTS

The risk adjustment which needs to be estimated is the last part from the above expression

$$Cov_t\left(RIR_{t,t+\tau}, ci_{t+\tau}\right)$$

Consistent with the Quantitative Industry Analysis, the paper assumes a simple first order regression for the RIR given by

$$RIR_{t,t+\tau} - RIR_t^o = \omega_r\left[RIR_{t,t+\tau-1} - RIR_t^o\right] + \varepsilon_{t+\tau}$$

where RIR_t^o is the structural level of the residual income return[39]. Note that the calculated RIR's is not based on Pandora's figures, but on a broader peer group[40]. The calculations of the necessary statement items are done with the same data which was used for the Quantitative Industry Analysis (Bloomberg). The calculation for ReOI and NOA are shown in that section. Then the estimates of RIR_t^o and ω_r are found by minimizing SSR (least square estimation) over the set of feasible values of RIR_t^o and ω_r using solver. An arithmetic average of the error term for each year and for each company in the panel data estimation, is calculated. This gives a 10 point (year) times-series of the estimated peer/industry specific innovations, ε. Table 21 shows the two estimated parameters.

For the consumption index it is assumed that it follows a simple geometric Brownian motion. ci thus follows the process

$$ci_{t+\tau} - ci_{t+\tau-1} = \nu + \delta_{t+\tau}$$

The innovations from the two equations, $\varepsilon_{t+\tau}$ and $\delta_{t+\tau}$, are assumed to be serially uncorrelated and to have the following distribution

$$\begin{bmatrix}\varepsilon_{t+\tau}\\ \delta_{t+\tau}\end{bmatrix} \sim N\left(0, \begin{Bmatrix}\sigma_r^2 & \sigma_{ra}\\ \sigma_{ra} & \sigma_a^2\end{Bmatrix}\right)$$

Consequently, δ and ε are contemporaneously correlated. This reflects the systematic risk in the residual income returns. To give a practical overview, we now have two series of innovations based on a 10 years' historical data. The contemporaneous covariance between the residual income and the consumption index σ_{ra} is the historical covariance between the two times series of δ and ε. The contemporaneous covariance is shown in Table 21.

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[38] And most asset pricing literature (Bach & Christensen, 2013) (Christensen & Feltham, 2009).
[39] The paper used the general term a in the Quantitative Industry Analysis.
[40] BICS: Jewelry & Watches Stores (11 companies)

Table 21 – Estimations for Risk-adjustments

Parameter	Value
ν	0.0353
RIR_t^o	0.1161
ω_r	0.5678
σ_{ra}	0.0317

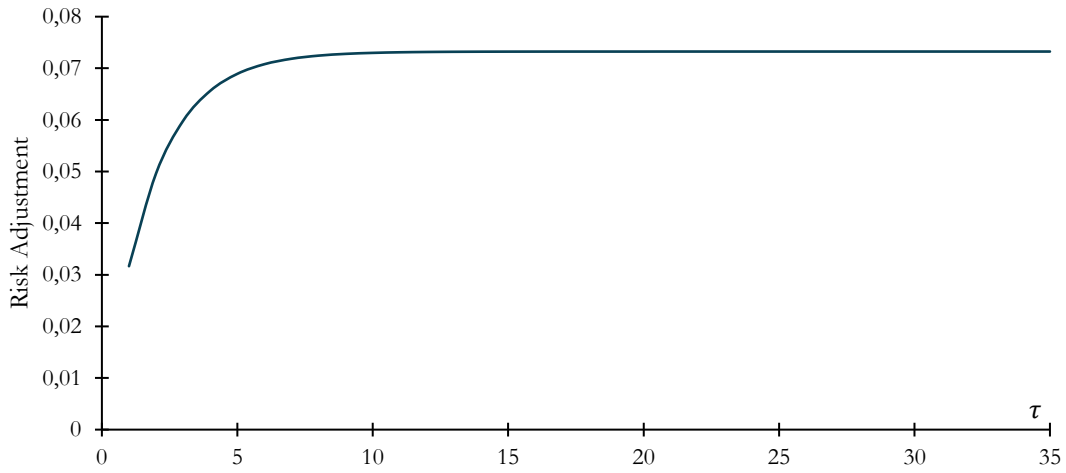
Source: Own contribution.

Now we can calculate the time varying risk adjustment with the formula derived by (Bach & Christensen, 2013). The risk-adjustment at time τ can be written as

$$Cov_t\left(RIR_{t,t+\tau}, ci_{t+\tau}\right) = \sigma_{ra}\frac{1-\omega_r^\tau}{1-\omega_r}$$

From the final expression it is clear the that the higher the covariance is, the higher is the risk-adjustment. The risk-adjustment depends on the contemporaneous covariance between the innovations, and the persistence parameter. As $\sigma_{ra} > 0$ the risk-adjustment increases in the persistence parameter ω_r. The development of the risk-adjustments is shown in Figure 25.

Figure 25 - Term Structure of Risk Adjustment



Source: Own contribution

11.3 CONTINUING VALUE

As in the ReOI model, two alternatives for calculating the continuing value will be made. A continuing value based on Gordon's Growth formula and a continuing value based on the fair market-to-book value. The firm value based on the Consumption valuation model with Gordon Growth formula as continuing value can be written as the following

$$\frac{V_t}{NOA_t} = 1 + \sum_{\tau=1}^{35}\frac{E_t\left(RIR_{t,t+\tau}\right) - \sigma_{ra}\frac{1-\omega_r^\tau}{1-\omega_r}}{\left(1+\iota_{t,t+\tau}\right)^\tau} + \frac{\left[E_t\left(RIR_{t,t+\tau}\right) - \sigma_{ra}\frac{1-\omega_r^{35}}{1-\omega_r}\right](1+\mu)}{\left(1+\iota_{t,t+35}\right)^{35}\left(\iota_{t,\infty}-\mu\right)}$$

where μ is the constant growth rate is assumed as 4.5% as in the ReOI model, $\iota_t$is the risk free interest rate found from the term-structure estimation and $\iota_{t,\infty}$ is the assumed long (constant) interest of 1.94%. Note we adjust for risk, and discount for time with the risk free interest rate. For the fair market-to-book method the same method as in the ReOI model, but is only discounted the risk free interest rate.

12 VALUATION

All the previous sections have formed the basis of the valuation of Pandora A/S. The Strategic Analysis as well as the Quantitative Industry Analysis produced knowledge in order to forecast Pandora's value creation. Section 3.8 and dealt with valuation methodology and the implementation of the two models. Later in the section the paper will sanity check the valuation estimates with the market prices as wells as using multiples for valuation.

12.1 REOI VALUATION

The valuation where the ReOI model is used, the paper uses two methods for calculating the continuing value. The first method is the very common method i.e. Gordons Growth model. The second method is using a fair market-to-book multiple which was found in the Quantitative Industry Analysis. In the valuation using Gordon's Growth model for calculating the continuing value, there is an assumption that the risk free interest rate is constant. Consequently, the continuing value is conducted in 2045 where the interest rate is leveled out, and all the value drivers has converged to the industry long-run levels. The fair market-to-book ratio does not rely on the same assumption. Yet the paper has chosen to calculate the fair market-to-book continuing value in 2045, as the paper wants that it only should be the value of the continuing value component which separates the two equity "values". One could argue that the implementation of the continuing value should be conducted when the value drivers achieves their long run level (approx. 2040). Since this is considered to be a relatively small change, it seems sensible to keep the forecasting period (explicit period + fade-rate period) alike in the two valuations. In Table 22 the results from the ReOI model valuations is listed.

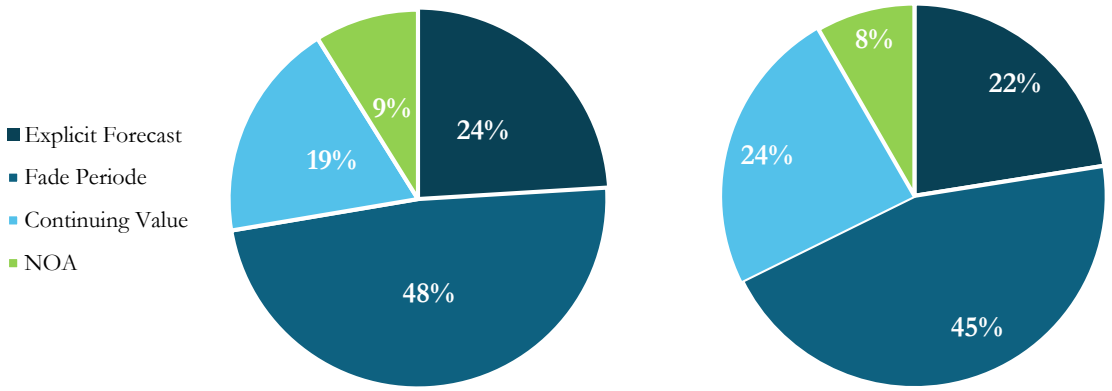
Table 22 – ReOI Valuation Results

Component	**Gordons Growth Formula**	**Fair Market-to-book ratio**
DKK million	Present value	Present value
Explicit period	21,298	21,298
Fade rate period	42,796	42,796
Continuing value	16,631	22,701
Net Operating Assets	7,877	7,877
Net Financial Obligations	1,865	1,865
Equity value	86,737	92,807
Number of shares	117.06	117.06
Share price*	**740.99**	**792.84**

Source: Own contribution. *Share price is denoted in DKK.

The two results yields to some degree the same results. The value of the equity is however very sensitive to the implementation of the continuing value term. The ReOI valuation using Gordon's growth model to value the continuing value then implies a share price of 740.99 DKK. The fair market to book value then implies a share value of 792,84 DKK. If the paper chooses to implement the market-to-book continuing term earlier in the time horizon, the differences in between the two estimates will have been even higher. Figure 26 shown the different components which contributes to the equity value.

Figure 26 – Equity Contribution Components in Percentage of Equity Value, ReOI



CV: Gordons Growth Formula CV: Fair Market-to-Book

Source: Own contribution

12.2 GE VALUATION

As in the ReOI model valuations, the GE valuation is conducted with two alternatives for calculating the continuing value, i.e. Gordons Growth model and fair market-to-book ratio. As in the ReOI valuation the implementation of the continuing value will be in year 2045. The valuation results can be seen in Table 23.

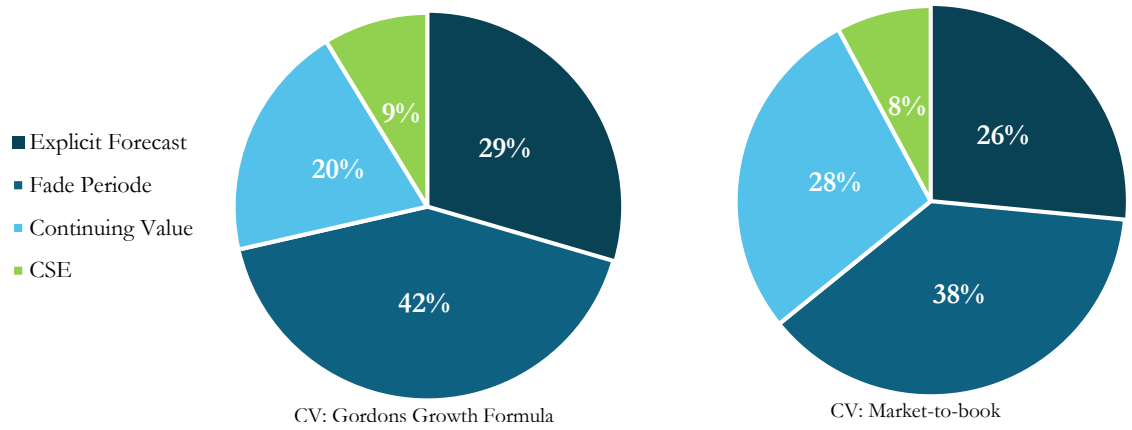
Table 23 – GE Valuation Results

Component	**Gordons Growth Formula**	**Fair Market-to-book ratio**
DKK million	Present value	Present value
Explicit period	20,284	20,284
Fade rate period	28,806	28,806
Continuing value	13,613	21,404
Net Operating Assets	7,877	7,877
Net Financial Obligations	1,865	1,865
Equity value	68,714	70,494
Number of shares	117.06	117.06
Share price*	**587.02**	**602.22**

Source: Own Contribution. * Share price is denoted in DKK.

The GE valuation using Gordon's growth model to value the continuing value then implies a share price of 587,02 DKK. The fair market to book value then implies a share value of 602,22 DKK. Figure 27 shows the parameters which contributes to equity. In this model the Gordon growth based valuation yields a higher value than the market-to-book method. This may be due to the relatively low interest rate.

Figure 27 - Equity Contribution Components in Percentage of Equity Value, GE



Source: Own contribution.

12.3 MULTIPLE VALUATION

Based on Pandora's main peers a multiple valuation is done. The paper has chosen to use EV/EBITDA and P/E as multiples. From the below tables the harmonic average yields a share price of 564 for the EV/EBITDA multiple and the P/E yields a share price of 945. This is to some degree consistent with the fundamental valuations. The paper is aware of the assumptions regarding multiple valuations such as accounting standards, expected growth rates, risk profile etc.

Table 24 – Multiples from Peers

Peers	EV/ EBITDA	P/E
Tiffany & Co	11	22
Signet Jewelers Ltd	8	12
PC Jeweller Ltd	11	18
Luk Fook Holdings Intl Ltd	10	15
Chow Tai Fook Jewellery Grou	15	27
Chow Sang Sang Hldg	10	13
Blue Nile Inc	23	50

Table 25 – Multiple Valuation Results

Per share price	EV/EBITDA	P/E
Arithmetic average	632	1166
Geometric average	594	1036
Harmonic average	564	945
Median	532	936
Low	399	624
High	1192	2600

13 SENSITIVITY ANALYSIS

The sensitivity analysis will be done in two parts as there is different parameters affecting each valuation method. Firstly, a sensitivity analysis of the parameters for the ReOI valuation model will be done. In the ReOI section, the two most critical parameters for the valuation will be described separately, as these are found are upward-most important.

13.1 REOI VALUATION

13.1.1 Equity Beta

The biggest weakness of the ReOI model is found to be the estimation of Equity Beta. This was estimated to be 1.77, but was however, very sensitive to the investigated time period. Deleting one weekly data from the regression changed the equity beta two 1.02. This will result in a share value of 1,759.80 (GGR) and 1,743.99 (MB). Unfortunately, this makes the validity of the valuation results very bad. This is so critical, that it is hard to conclude anything from the estimated results. One can argue for and against the choice of time period. But as argued in cost of capital section, the paper chose not to adjust for this extreme value because their closest peer Tiffany & Co.´s estimated beta was 1.88.

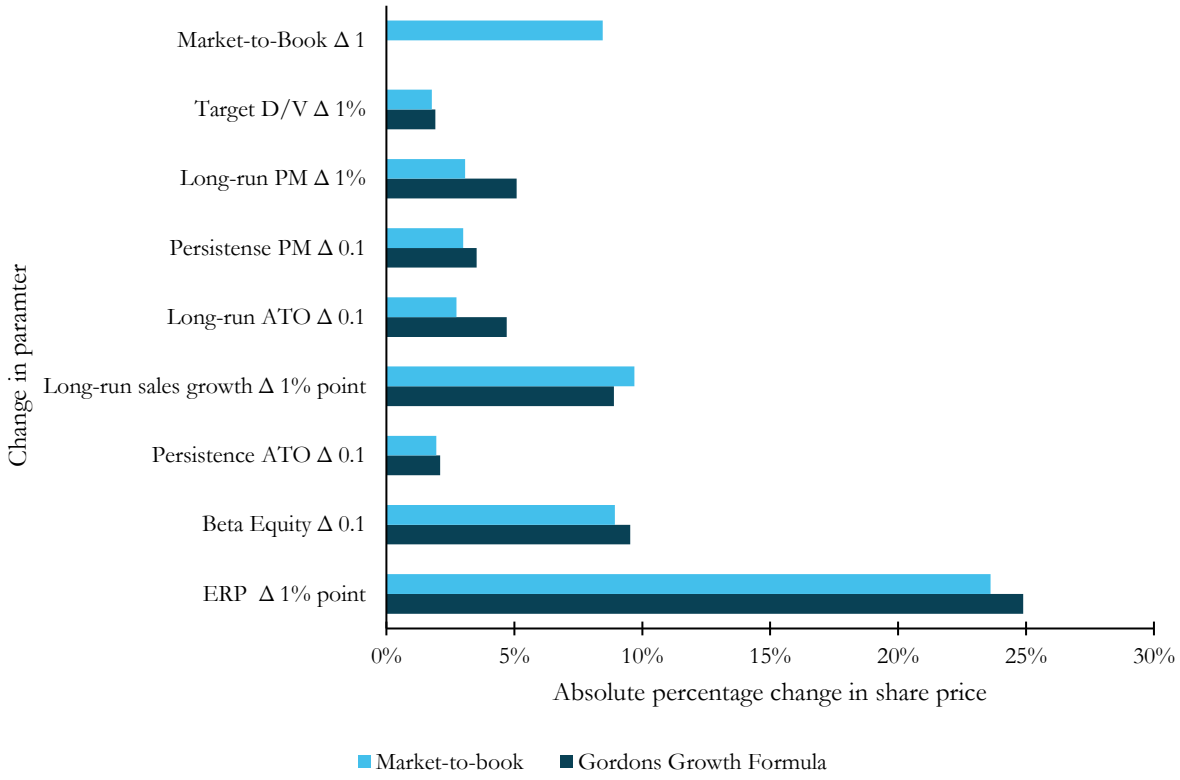
13.1.2 Asset Turnover

Pandora has a current asset turnover of 2.21. But the long-run industry level and close peer level, estimates the long-run level to be around 1.02. This is quite a big change, although realistic, as it is not many years ago Pandora operated with an asset turnover of 1. The paper has chosen to rely on estimation in the quantitative industry analysis. However, if the paper interpret that Pandora can maintain their currently asset turnover levels it will give results on 958.46 (GGR) and 930.79 (MB).

13.1.3 Parameters in General

Figure 28 shows the sensitivity to different parameters in the ReOI valuations. As for all risk discounting valuation models the equity risk premium has a high impact. The paper chose a risk premium of 6% but could with valid sources have used a risk premium as low as 5 %, giving a approx. 25% increased share price.

Figure 28 - Share Price Sensitivity to Parameters (ReOI)

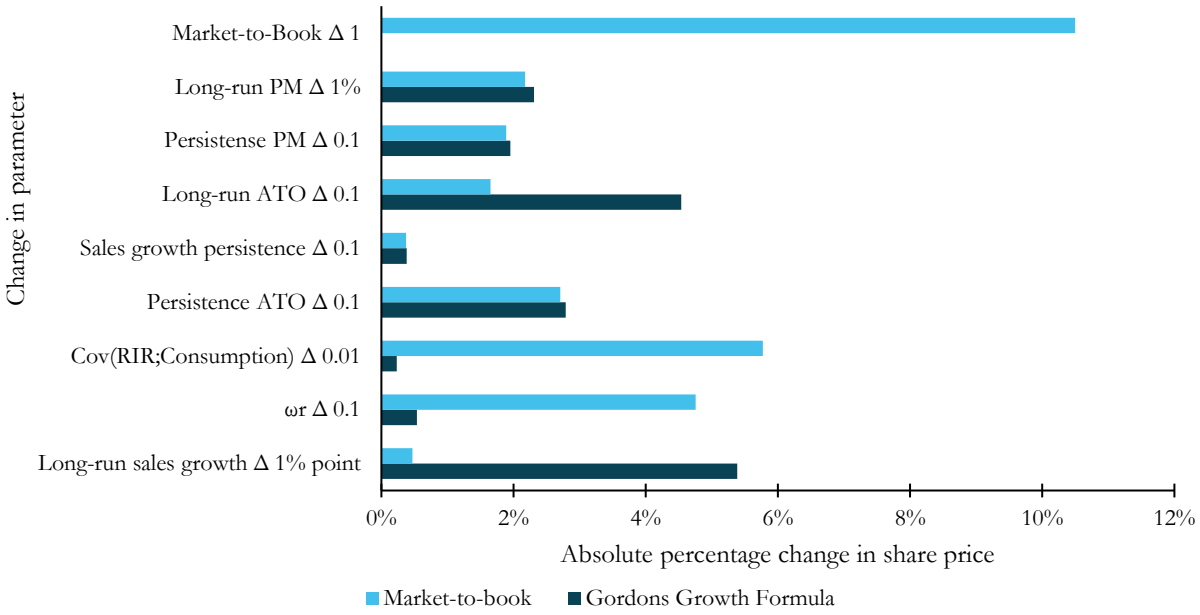


Source: Own Contribution

13.1.4 GE Valuation

Figure 29 shows the same as the above figure but for the General Equilibrium valuation. This valuation seems more robust, although the valuation with the market-to-book for continuing value is sensitive. In the Market to-book valuation the ratio is found to be the most sensitive. As the covariance between residual operating earnings and the consumption index is high, the parameter seems robust.

Figure 29 – Share price Sensitivity to Parameter (GE)



Source: Own Contribution

14 CONCLUSION

After Pandora's IPO in 2010 the market share price has increased significantly. This motivated the author to critically challenge Pandora's market price, as fear of the market price may overshoot fundamentals. The author chose to do the valuation based on the residual operating income model, where two different methods for risk adjusting were applied. Due to the fact that the continuing value often is a high sensitive specification, the paper chose to use two different methods for calculating this term specification, Gordon's Growth Model and a fair market-to-book ratio. The result was four base estimates for the Pandora share in the interval [587.02;792.84].

In order to reach these values, the paper did several findings. After the company description and the introduction of models and methodology section, the paper proceeds into an in-deep strategic analysis of Pandora and the surrounding companies. A key finding in the strategic analysis was, that the fact Pandora's costumers were found to be very price sensitive. The paper concluded this, based on an event in 2011, where Pandora increased prices as a result of increasing commodity prices, which resulted in disappointing sales figures and a 60% decrease of the market share price. This finding was important, as it shows Pandora is particularly sensitive to changes in costs, as Pandora cannot "transfer" increasing production cost towards consumers unpunished. As more than 90% of Pandora's cost of sold goods relates to purchase of commodities, the threat is high, since prices of commodities are very volatile. As Pandora is not hedged long-term, this was found to be Pandora's biggest threat.

Another key finding in the strategic analysis was the change in the jewelry market, where branded jewelry has taken a high market share of the total jewelry market. Several market reports suggest, that this trend will continue. It is therefore extremely important for Pandora to continue to develop their brand, as it is in this segment, the continued growth must be found. Although Pandora has had an impressive sales growth, it has held a fixed ratio between marketing-costs/sales, which indicates that Pandora is very much aware of this. Finally, the strategic analysis states that the concern regarding charms bracelets being a fad is no longer reasonable. On the basis of the product's steady growth dating back to 2000, the paper argues that one should perceive charms bracelets as a jewelry category like rings, earrings, necklace etc. There will of course be fashion trends within these categories, which could hamper Pandora, but stating one of these categories could be fad is frivolous. It is therefore still important for Pandora to capitalize more on their other jewelry offerings.

One of the main purposes of the financial statement analysis was to use the reformulate statements in order to satisfy the clean surplus relationship and separate operations from financial activities, as it is a prerequisite for both valuation models. Finally, the analysis conducted a profitability analysis where the main finding was that Pandora is really great at giving return on their invested capital. Pandora has managed to improve their turnover 2.5 times with a small change in NOA (33% increase). This is due to Pandora's manual work force, and that Pandora has reduced their money bindings significantly. The quantitative industry analysis gave key insight to forecast the value drivers for the ReOI model. As Pandora currently beats all their peers in terms of value

drivers, the analysis was highly useful at finding the long-standing industry level for the value drivers. Additionally, the analysis estimated how fast the value drivers will converge to industry level. This information was mainly used after the explicit forecast.

The explicit forecast was done based on the above mentioned knowledge. Since Pandora historically has delivered on announced store openings, and the fact that concept store openings are the main sales driver, the explicit forecast was based on concept store openings. Based on Pandora concept stores per inhabitant, it was found that Pandora with a conservative estimate could open 1,500 concept stores in Europe and North America alone. On the cost side commodity prices were used as primary cost driver. To forecast these prices, futures on silver and gold were used as proxy for the future cost margin, as the paper assumed that Pandora will not change its prices, since Pandora's consumers are price sensitive. With a forecast of residual operating income in place the paper needed to estimate how the income should be adjusted to the associated risks. Firstly, the paper estimated the term structure of the risk free interest rate, as this was used in both models. Secondly, the paper estimated the firm cost of capital for the ReOI Model. The most critical in this estimation was the uncertainty about estimating the equity beta, as this regression parameter was extremely sensitive to the choice of time period. The paper concludes this to be the valuations biggest uncertainty factor. Thirdly, the estimation of the GE-risk adjustment was done in order to risk adjust the residual operating income, in the GE-model. Finally, the valuation estimates were found and the results showed that market price of Pandora seems to be in a moderate degree to be supported by fundamentals. However, since the validity of the ReOI results is very low, as the equity beta could be estimated in the range of [1.02;1.77] the fair value of Pandora is perhaps significantly higher, based on the forecasting.

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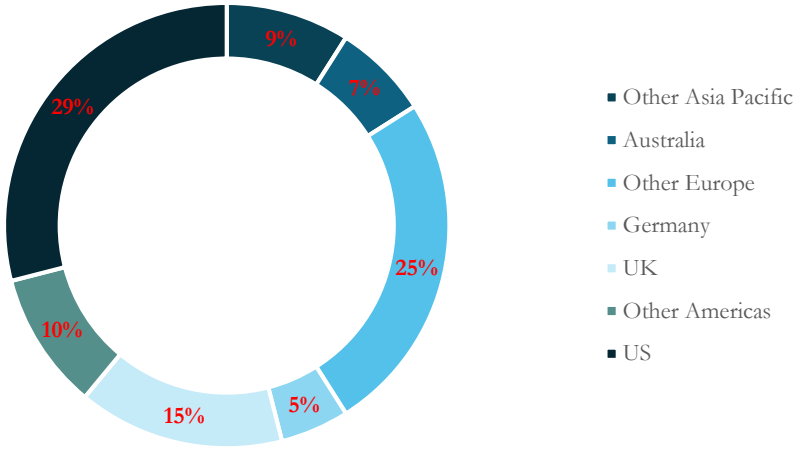
15 APPENDIX

15.1 APPENDIX A: COMPANY DESCRIPTION

Revenue by Geography



15.2 APPENDIX B: FINANCIAL STATEMENT ANALYSIS

Reported Income Statement

DKK million	2011	2012	2013	2014	2015
Revenue	6,658	6,652	9,010	11,942	16,737
Cost of sales	-1,798	-2,223	-3,011	-3,519	-4,544
Gross profit	**4,860**	**4,429**	**5,999**	**8,423**	**12,193**
Sales and distribution expenses	-1,079	-1,261	-1,517	-1,957	-3,120
Marketing expenses	-974	-823	-880	-1,143	-1,602
Administrative expenses	-749	-870	-921	-1,251	-1,657
Operating profit	**2,058**	**1,475**	**2,681**	**4,072**	**5,814**
Finance income	642	132	167	14	84
Finance costs	-331	-128	-106	-214	-553
Profit before tax	**2,369**	**1,479**	**2,742**	**3,872**	**5,345**
Income tax expense	-332	-277	-522	-774	-1,671
Net profit for the year	**2,037**	**1,202**	**2,220**	**3,098**	**3,674**

Notes

Note 0: Tax rate and effective tax rate	**2011**	**2012**	**2013**	**2014**	**2015**
Effective tax rate	14.01%	18.73%	19.04%	19.99%	31.26%
Tax rate	25%	25%	25%	24.50%	23.50%
Effective tax rate	21%				

Reformulated Income Statement

DKK million	2011	2012	2013	2014	2015
Revenue	6,658	6,652	9,010	11,942	16,737
Cost of sales	-1,780	-2,202	-2,970	-3,470	-4,533
Gross Profit	**4,878**	**4,450**	**6,040**	**8,472**	**12,204**
Sales, distribution and marketing expenses	-1,890	-1,982	-2,314	-3,008	-4,581
Administrative expenses	-709	-813	-845	-1,170	-1,537
EBITDA	**2,279**	**1,655**	**2,881**	**4,294**	**6,086**
Depreciation, amortisation and impairment losses on cost of sales	-18	-21	-41	-49	-11
Depreciation, amortisation and impairment losses on sales, distribution and marketing expenses	-163	-102	-83	-92	-141
Depreciation, amortisation and impairment losses on administrative expenses	-40	-57	-76	-81	-120
EBIT	2,058	1,475	2,681	4,072	5,814
Tax on EBIT	-254	-276	-507	-823	-1,781
NOPAT	**1,804**	**1,199**	**2,174**	**3,249**	**4,033**
Other comprehensive income					
Value adjustment of hedgning instruments	-551	203	-98	-18	23
Exchange differences on translation of foreign subsidiaries	247	-65	-355	537	249
Income tax on other comprehensive income	13	-18	6	5	22
CWE earn-out	511	51	-	-	-
Tax on other comprehensive income	-128	-13	-	-	-
Operating profit from other comprehensive income, after tax	92	158	-447	524	294
Operating Income after tax	1,896	1,357	1,727	3,773	4,327
Finance income					
Fair value adjustments, financial instruments	127	-	-	-	2
Foreign exchange gains	-	77	163	7	79
Interest income, banks	2	2	2	1	3
Interest income, loans and receivables	2	2	2	6	-
Total Finance income	131	81	167	14	84
Finance costs					
Fair value adjustments, financial instruments	-	-9	-	-50	-199
Foreign exchange losses	-193	-72	-54	-89	-234
Interst on loans and borrowings	-45	-25	-5	-4	-10
Interest on CWE earn-out	-44	-	-	-	-
Other finance costs	-49	-22	-47	-71	-110
Total finance costs	-331	-128	-106	-214	-553
Net financial costs	**-200**	**-47**	**61**	**-200**	**-469**
Tax benefit	50	12	-15	49	110
Net financial cost after tax	**-150**	**-35**	**46**	**-151**	**-359**
Comprehensive income to common	**1,746**	**1,322**	**1,773**	**3,622**	**3,968**

Reported Balance Sheet

DKK million	*Notes*	2011	2012	2013	2014	2015
Assets						
Goodwill		1,928	1,922	1,904	2,080	2,424
Brand		1,053	1,053	1,053	1,053	1,057
Distribution network		336	331	300	268	216
Distributuion rights		1,064	1,045	1,042	1,047	1,069
Other intangible assets		95	136	318	411	683
Total intangible assets	**3.1**	**4,476**	**4,487**	**4,617**	**4,859**	**5,449**
Property, plants and equipment	3.2	429	472	497	711	1,237
Defferred tax assets	2.5	209	190	276	407	879
Other non-current financial assets		34	26	48	99	159
Total non-current assets		**5,148**	**5,175**	**5,438**	**6,076**	**7,724**
Inventories		1,609	1,318	1,490	1,684	2,357
Financial instruments		-	4	-	99	65
Trade receivables		900	940	895	1,110	1,360
Income tax receivable		41	138	35	52	113
Other receivables		177	498	731	404	803
Cash		176	341	686	1,131	889
Total current assets		**2,903**	**3,239**	**3,837**	**4,480**	**5,587**
Total assets		**8,051**	**8,414**	**9,275**	**10,556**	**13,311**
Equity and liabilities						
Share capital	4.1	130	130	130	128	122
Share premium		1,248	1,248	1,248	1,229	-
Treasury shares		-38	-38	-738	-2,679	-4,152
Reserves		620	652	205	729	1,023
Proposed divided		715	715	823	1,088	1,511
Retained earnings		2,736	3,331	4,794	6,537	7,635
Total equity		**5,411**	**6,038**	**6,462**	**7,032**	**6,139**
Provisions	3.5	64	7	35	61	97
Loans and borrowings	4.3, 4.4	375	151	-	-	2,350
Deffered tax liabilities	2.5	552	552	471	430	394
Other payables		2	2	3	-	249
Total non-current liabilities		993	712	509	491	3,090
Provisions	3.5	230	463	471	678	971
Loans and borrowings	4.3, 4.4	10	7	49	10	257
Financial instruments	4.4, 4.5	-	47	148	268	214
Trade payables	4.4	288	219	539	804	1,329
Income tax payable		344	283	546	643	306
Other payables		775	645	551	630	1,005
Total current liabilities		1,647	1,664	2,304	3,033	4,082
Total liabilities		**2,640**	**2,376**	**2,813**	**3,524**	**7,172**
Total equity and liabilities		**8,051**	**8,414**	**9,275**	**10,556**	**13,311**

Reformulated Balance Sheet

DKK million	2011	2012	2013	2014	2015
Operations					
Goodwill	1,928	1,922	1,904	2,080	2,424
Brand	1,053	1,053	1,053	1,053	1,057
Distribution network	336	331	300	268	216
Distribution rights	1,064	1,045	1,042	1,047	1,069
Other intangible assets	95	136	318	411	683
Property, plants and equipment	429	472	497	711	1,237
Deferred tax assets	209	190	276	407	879
Operating assets, non-current	5,114	5,149	5,390	5,977	7,565
Inventories	1,609	1,318	1,490	1,684	2,357
Financial instruments	-	4	-	99	65
Trade receivables	900	940	895	1,110	1,360
Income tax receivable	41	138	35	52	113
Other recievables	177	498	731	404	803
Operating assets, current	2,727	2,898	3,151	3,349	4,698
Operating Assets	**7,841**	**8,047**	**8,541**	**9,326**	**12,263**
Provisions	64	7	35	61	97
Deffered tax liabilities	552	552	471	430	394
Other payables	2	2	3	-	249
Share-based compensation	-	20	64	170	127
Operating liabilities, non-current	618	581	573	661	867
Provisions	230	463	471	678	971
Financial instruments	-	47	148	268	214
Trade payables	288	219	539	804	1,329
Other payables	775	645	551	630	1,005
Operating liabilities, current	1,293	1,374	1,709	2,380	3,519
Operating Liabilities	**1,911**	**1,955**	**2,282**	**3,041**	**4,386**
Net Operating Assets	**5,930**	**6,092**	**6,259**	**6,285**	**7,877**
Net Working Capital	**1,434**	**1,524**	**1,442**	**969**	**1,179**
Financial					
Common Shareholder Equity	**5,411**	**6,018**	**6,398**	**6,862**	**6,012**
Other non-current financial assets	34	26	48	99	159
Cash	176	341	686	1,131	889
Financial assets	210	367	734	1,230	1,048
Interest-bearing loans and borrowings	375	151	-	-	2,350
Financial liabilities, non-current	375	151	-	-	2,350
Income tax payable	344	283	546	643	306
Interest-bearing loans and borrowings	10	7	49	10	257
Financial liabilities, current	354	290	595	653	563
Net Interest Bearing Debt	**519**	**74**	**-139**	**-577**	**1,865**
Net Operating Assets	**5,930**	**6,092**	**6,259**	**6,285**	**7,877**

Reported Equity Statement

DKK million	*Notes*	Share capital	Share premium	Treasury shares	Translation reserve	Hedgning reserve	Other reserves	Proposed dividend	Retained earnings	Total equity
Equity at 1 January 2015		128	1,229	-2,679	885	-156	-	1,088	6,537	7,032
Net profit fo the year		-	-	-	-	-	-	-	3,674	3,674
Exchange rate differences on translation of foreign susidiaries		-	-	-	249	-	-	-	-	249
Value adjustent of hedgning instruments		-	-	-	-	23	-	-	-	23
Tax on other comprehensive income	*2.5*	-	-	-	-	22	-	-	-	22
Other comprehensive Income, net of tax		-	-	-	249	45	-	-	-	294
Total Comprehensive income for the year		**-**	**-**	**-**	**249**	**45**	**-**	**-**	**3,674**	**3,968**
Transfers		-	-1,229	-	-	-	-	-	1,229	-
Share-based payments	*2.4*	-	-	266	-	-	-	-	-139	127
Purchase of treasury shares		-	-	-3,900	-	-	-	-	-	-3,900
Reduction of share capital		-6	-	2,161	-	-	-	-	-2,155	-
Dividend paid	*4.2*	-	-	-	-	-	-	-1,088	-	-1,088
Proposed Dividend	*4.2*	-	-	-	-	-	-	1,511	-1,511	-
Equity at 31 December 2015		**122**	**-**	**-4,152**	**1,134**	**-111**	**-**	**1,511**	**7,635**	**6,139**

DKK million	*Notes*	Share capital	Share premium	Treasury shares	Translation reserve	Hedgning reserve	Other reserves	Proposed dividend	Retained earnings	Total equity
Equity at 1 January 2014		130	1,248	-738	348	-143	-	823	4,794	6,462
Net profit fo the year		-	-	-	-	-	-	-	3,098	3,098
Exchange rate differences on translation of foreign susidiaries		-	-	-	537	-	-	-	-	537
Value adjustent of hedgning instruments		-	-	-	-	-18	-	-	-	-18
Tax on other comprehensive income	*2.5*	-	-	-	-	5	-	-	-	5
Other comprehensive Income, net of tax		-	-	-	537	-13	-	-	-	524
Total Comprehensive income for the year		**-**	**-**	**-**	**537**	**-13**	**-**	**-**	**3,098**	**3,622**
Share-based payments	*2.4*	-	-	36	-	-	-	-	134	170
Purchase of treasury shares		-	-	-2,400	-	-	-	-	-2	-2,402
Reduction of share capital		-2	-19	423	-	-	-	-	-402	-
Dividend paid	*4.2*	-	-	-	-	-	-	-823	3	-820
Proposed Dividend	*4.2*	-	-	-	-	-	-	1,088	-1,088	-
Equity at 31 December 2014		**128**	**1,229**	**-2,679**	**885**	**-156**	**-**	**1,088**	**6,537**	**7,032**

DKK million	*Notes*	Share capital	Share premium	Treasury shares	Translation reserve	Hedgning reserve	Other reserves	Proposed dividend	Retained earnings	Total equity
Equity at 1 January 2013		130	1,248	-38	703	-51	-	715	3,331	6,038
Net profit fo the year		-	-	-	-	-	-	-	2,220	2,220
Exchange rate differences on translation of foreign susidiaries		-	-	-	-355	-	-	-	-	-355
Value adjustent of hedgning instruments		-	-	-	-	-98	-	-	-	-98
Tax on other comprehensive income	*2.5*	-	-	-	-	6	-	-	-	6
Other comprehensive Income, net of tax		-	-	-	-355	-92	-	-	-	-447
Total Comprehensive income for the year		**-**	**-**	**-**	**-355**	**-92**	**-**	**-**	**2,220**	**1,773**
Share-based payments	*2.4*	-	-	-	-	-	-	-	64	64
Purchase of treasury shares		-	-	-700	-	-	-	-	-	-700
Dividend paid	*4.2*	-	-	-	-	-	-	-715	2	-713
Proposed Dividend	*4.2*	-	-	-	-	-	-	823	-823	-
Equity at 31 December 2013		**130**	**1,248**	**-738**	**348**	**-143**	**-**	**823**	**4,794**	**6,462**

DKK million	*Notes*	Share capital	Share premium	Treasury shares	Translation reserve	Hedgning reserve	Other reserves	Proposed dividend	Retained earnings	Total equity
Equity at 1 January 2012		130	1,248	-38	768	-236	88	715	2,736	5,411
Net profit fo the year		-	-	-	-	-	-	-	1,202	1,202
Exchange rate differences on translation of foreign susidiaries		-	-	-	-65	-	-	-	-	-65
Value adjustent of hedgning instruments		-	-	-	-	203	-	-	-	203
Tax on other comprehensive income	*2.5*	-	-	-	-	-18	-	-	-	-18
Other comprehensive Income, net of tax		-	-	-	-65	185	-	-	-	120
Total Comprehensive income for the year		**-**	**-**	**-**	**-65**	**185**	**-**	**-**	**1,202**	**1,322**
Transfer to retained earnings		-	-	-	-	-	-88	-	88	-
Share-based payments	*2.4*	-	-	-	-	-	-	-	20	20
Dividend paid	*4.2*	-	-	-	-	-	-	-715	-	-715
Proposed Dividend	*4.2*	-	-	-	-	-	-	715	-715	-
Equity at 31 December 2012		**130**	**1,248**	**-38**	**703**	**-51**	**-**	**715**	**3,331**	**6,038**

DKK million	*Notes*	Share capital	Share premium	Treasury shares	Translation reserve	Hedgning reserve	Other reserves	Proposed dividend	Retained earnings	Total equity
Equity at 1 January 2011		130	1,248	-38	521	302	88	650	1,414	4,315
Net profit fo the year		-	-	-	-	-	-	-	2,037	2,037
Exchange rate differences on translation of foreign susidiaries		-	-	-	247	-	-	-	-	247
Value adjustent of hedgning instruments		-	-	-	-	-551	-	-	-	-551
Tax on other comprehensive income	*2.5*	-	-	-	-	13	-	-	-	13
Other comprehensive Income, net of tax		-	-	-	247	-538	-	-	-	-291
Total Comprehensive income for the year		**-**	**-**	**-**	**247**	**-538**	**-**	**-**	**2,037**	**1,746**
Transfer to retained earnings		-	-	-	-	-	-	-	-	-
Share-based payments	*2.4*	-	-	-	-	-	-	-	-	-
Dividend paid	*4.2*	-	-	-	-	-	-	-650	-	-650
Proposed Dividend	*4.2*	-	-	-	-	-	-	715	-715	-
Equity at 31 December 2011		**130**	**1,248**	**-38**	**768**	**-236**	**88**	**715**	**2,736**	**5,411**

Reformulated Equity Statement

DKK million	2011	2012	2013	2014	2015
Primo equity	4,315	5,411	6,038	6,462	7,032
Transactions with shareholders					
+ Sharebased payments	-	-	-	-	-
+ Capital increase	-	-	-	-	-
- Capital decrease	-	-	-	-	-
- Purchase of treasury shares	-	-	-700	-2,402	-3,900
- Dividend paid	-650	-715	-713	-820	-1,088
Net cash contribution (negative net dividends)	-650	-715	-1,413	-3,222	-4,988
Other comprehensive income					
Net Profit for the year	2,037	1,202	2,220	3,098	3,674
Exchange differences on translation of foreign subsidiaries	247	-65	-355	537	249
Value adjustment of hedgning instruments	-551	203	-98	-18	23
Income tax on other comprehensive income	13	-18	6	5	22
Comprehensive income avaiable to common	1,746	1,322	1,773	3,622	3,968
Ultimo equity	**5,411**	**6,018**	**6,398**	**6,862**	**6,012**
Reconciliation of equity					
Ultimo equity reported	5,411	6,038	6,462	7,032	6,139
Share-based compensation	-	-20	-64	-170	-127
Ultimo equity corrected	**5,411**	**6,018**	**6,398**	**6,862**	**6,012**

Trend Analysis on Income Statement

Trend (percentage)	2011	2012	2013	2014	2015
Revenue	100%	100%	135%	179%	251%
Cost of sales	100%	124%	167%	195%	255%
Gross Profit	**100%**	**91%**	**124%**	**174%**	**250%**
Sales, distribution and marketing expenses	100%	105%	122%	159%	242%
Administrative expenses	100%	115%	119%	165%	217%
EBITDA	**100%**	**73%**	**126%**	**188%**	**267%**
Depreciation, amortisation and impairment losses on cost of sales	100%	117%	228%	272%	61%
Depreciation, amortisation and impairment losses on sales, distribution and marketing expenses	100%	63%	51%	56%	87%
Depreciation, amortisation and impairment losses on administrative expenses	100%	143%	190%	203%	300%
EBIT	**100%**	**72%**	**130%**	**198%**	**282%**
Tax on EBIT	100%	109%	199%	324%	701%
NOPAT	**100%**	**66%**	**121%**	**180%**	**224%**
Other comprehensive income					
Value adjustment of hedgning instruments	100%	-37%	18%	3%	-4%
Exchange differences on translation of foreign subsidiaries	100%	-26%	-144%	217%	101%
Income tax on other comprehensive income	100%	-138%	46%	38%	169%
CWE earn-out	100%	10%	0%	0%	0%
Tax on other comprehensive income	100%	10%	0%	0%	0%
Operating profit from other comprehensive income, after tax	100%	172%	-485%	568%	319%
Operating income (after tax)	**100%**	**72%**	**91%**	**199%**	**228%**
Finance income					
Fair value adjustments, financial instruments	100%	0%	0%	0%	2%
Foreign exchange gains					
Interest income, banks	100%	100%	100%	50%	150%
Interest income, loans and receivables	100%	100%	100%	300%	0%
Total Finance income	100%	62%	127%	11%	64%
Finance costs					
Fair value adjustments, financial instruments					
Foreign exchange losses	100%	37%	28%	46%	121%
Interst on loans and borrowings	100%	56%	11%	9%	22%
Interest on CWE earn-out	100%	0%	0%	0%	0%
Other finance costs	100%	45%	96%	145%	224%
Total finance costs	100%	39%	32%	65%	167%
Net financial costs	100%	24%	-31%	100%	235%
Tax benefit	100%	24%	-31%	98%	220%
Net financial cost after tax	100%	24%	-31%	101%	239%
Comprehensive income to common	**100%**	**76%**	**102%**	**207%**	**227%**

Common-Size Analysis on Income Statement

Common-Size (percentage)	2011	2012	2013	2014	2015
Revenue	100%	100%	100%	100%	100%
Cost of sales	-27%	-33%	-33%	-29%	-27%
Gross Profit	**73%**	**67%**	**67%**	**71%**	**73%**
Sales, distribution and marketing expenses	-28%	-30%	-26%	-25%	-27%
Administrative expenses	-11%	-12%	-9%	-10%	-9%
EBITDA	**34%**	**25%**	**32%**	**36%**	**36%**
Depreciation, amortisation and impairment losses on cost of sales	0%	0%	0%	0%	0%
Depreciation, amortisation and impairment losses on sales, distribution and marketing expenses	-2%	-2%	-1%	-1%	-1%
Depreciation, amortisation and impairment losses on administrative expenses	-1%	-1%	-1%	-1%	-1%
EBIT	**31%**	**22%**	**30%**	**34%**	**35%**
Tax on EBIT	-4%	-4%	-6%	-7%	-11%
NOPAT	**27%**	**18%**	**24%**	**27%**	**24%**
Other comprehensive income					
Value adjustment of hedgning instruments	-8%	3%	-1%	0%	0%
Value adjustment of hedgning instruments	4%	-1%	-4%	4%	1%
Income tax on other comprehensive income	0%	0%	0%	0%	0%
CWE earn-out	8%	1%	0%	0%	0%
Tax on other comprehensive income	-2%	0%	0%	0%	0%
Operating profit from other comprehensive income, after tax	1%	2%	-5%	4%	2%
Operating income (after tax)	**28%**	**20%**	**19%**	**32%**	**26%**
Finance income					
Fair value adjustments, financial instruments	2%	0%	0%	0%	0%
Foreign exchange gains	0%	1%	2%	0%	0%
Interest income, banks	0%	0%	0%	0%	0%
Interest income, loans and receivables	0%	0%	0%	0%	0%
Total Finance income	2%	1%	2%	0%	1%
Finance costs					
Fair value adjustments, financial instruments	0%	0%	0%	0%	-1%
Foreign exchange losses	-3%	-1%	-1%	-1%	-1%
Interst on loans and borrowings	-1%	0%	0%	0%	0%
Interest on CWE earn-out	-1%	0%	0%	0%	0%
Other finance costs	-1%	0%	-1%	-1%	-1%
Total finance costs	-5%	-2%	-1%	-2%	-3%
Net financial costs	**-3%**	**-1%**	**1%**	**-2%**	**-3%**
Tax benefit	1%	0%	0%	0%	1%
Net financial cost after tax	**-2%**	**-1%**	**1%**	**-1%**	**-2%**
					0%
Comprehensive income to common	**26%**	**20%**	**20%**	**30%**	**24%**

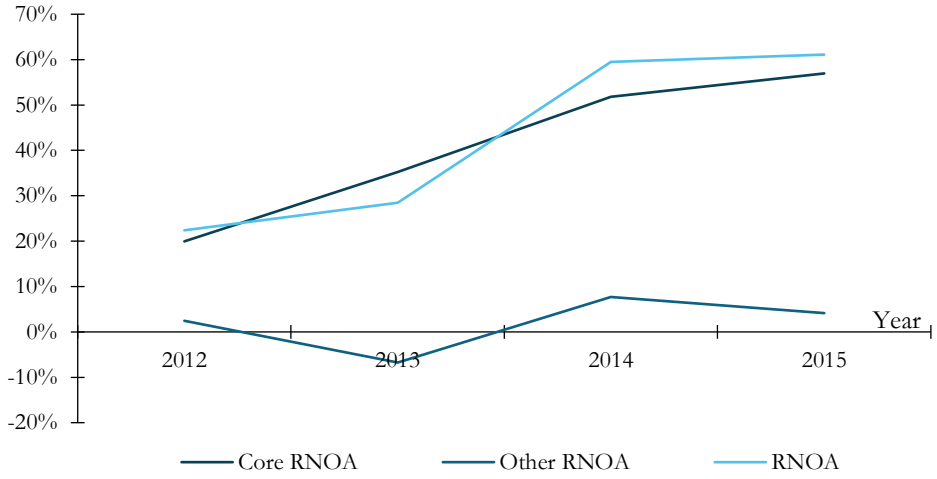
Trend Analysis on Balance Sheet

Trend (percentage)	2011	2012	2013	2014	2015
Goodwill	100%	100%	99%	108%	126%
Brand	100%	100%	100%	100%	100%
Distribution network	100%	99%	89%	80%	64%
Distribution rights	100%	98%	98%	98%	100%
Other intangible assets	100%	143%	335%	433%	719%
Property, plants and equipment	100%	110%	116%	166%	288%
Deferred tax assets	100%	91%	132%	195%	421%
Operating assets, non-current	100%	101%	105%	117%	148%
Inventories	100%	82%	93%	105%	146%
Financial instruments					
Trade receivables	100%	104%	99%	123%	151%
Income tax receivable	100%	337%	85%	127%	276%
Other recievables	100%	281%	413%	228%	454%
Operating assets, current	100%	106%	116%	123%	172%
Operating Assets	100%	103%	109%	119%	156%
Provisions	100%	11%	55%	95%	152%
Deffered tax liabilities	100%	100%	85%	78%	71%
Other payables	100%	100%	150%	0%	12450%
Share-based compensation					
Operating liabilities, non-current	100%	94%	93%	107%	140%
Provisions	100%	201%	205%	295%	422%
Financial instruments					
Trade payables	100%	76%	187%	279%	461%
Income tax payable	100%	82%	159%	187%	89%
Other payables	100%	83%	71%	81%	130%
Operating liabilities, current	100%	106%	132%	184%	272%
Operating Liabilities	100%	102%	119%	159%	230%
Net Operating Assets	100%	103%	106%	106%	133%
Net Working Capital	100%	106%	101%	68%	82%
Financial					
Common Shareholder Equity	100%	111%	118%	127%	111%
Other non-current financial assets	100%	76%	141%	291%	468%
Cash	100%	194%	390%	643%	505%
Financial assets	100%	175%	350%	586%	499%
Interest-bearing loans and borrowing	100%	40%	0%	0%	627%
Financial liabilities, non-current	100%	40%	0%	0%	627%
Interest-bearing loans and borrowing	100%	70%	490%	100%	2570%
Financial liabilities, current	100%	82%	168%	184%	159%
Net Interest Bearing Debt	100%	14%	-27%	-111%	359%
Net Operating Assets	100%	103%	106%	106%	133%

Common Size Analysis on Balance Sheet

Common-Size (percentage)	**2011**	**2012**	**2013**	**2014**	**2015**
Operations					
Goodwill	100%	100%	100%	100%	100%
Brand	55%	55%	55%	51%	44%
Distribution network	17%	17%	16%	13%	9%
Distribution rights	55%	54%	55%	50%	44%
Other intangible assets	5%	7%	17%	20%	28%
Property, plants and equipment	22%	25%	26%	34%	51%
Deferred tax assets	11%	10%	14%	20%	36%
Operating assets, non-current	265%	268%	283%	287%	312%
Inventories	83%	69%	78%	81%	97%
Financial instruments	0%	0%	0%	5%	3%
Trade receivables	47%	49%	47%	53%	56%
Income tax receivable	2%	7%	2%	3%	5%
Other recievables	9%	26%	38%	19%	33%
Operating assets, current	141%	151%	165%	161%	194%
Operating assets	**407%**	**419%**	**449%**	**448%**	**506%**
	0%	0%	0%	0%	0%
Provisions	3%	0%	2%	3%	4%
Deffered tax liabilities	29%	29%	25%	21%	16%
Other payables	0%	0%	0%	0%	10%
Share-based compensation	0%	1%	3%	8%	5%
Operating liabilities, non-current	32%	30%	30%	32%	36%
Provisions	12%	24%	25%	33%	40%
Financial instruments	0%	2%	8%	13%	9%
Trade payables	15%	11%	28%	39%	55%
Income tax payable	18%	15%	29%	31%	13%
Other payables	40%	34%	29%	30%	41%
Operating liabilities, current	67%	71%	90%	114%	145%
Operating Liabilities	**99%**	**102%**	**120%**	**146%**	**181%**
Net Operating Assets	**308%**	**317%**	**329%**	**302%**	**325%**
Net Working Capital	**74%**	**79%**	**76%**	**47%**	**49%**
Financial					
Common Shareholder Equity	**281%**	**313%**	**336%**	**330%**	**248%**
Other non-current financial assets	2%	1%	3%	5%	7%
Cash	9%	18%	36%	54%	37%
Financial assets	11%	19%	39%	59%	43%
Interest-bearing loans and borrowings	19%	8%	0%	0%	97%
Financial liabilities, non-current	19%	8%	0%	0%	97%
Interest-bearing loans and borrowings	1%	0%	3%	0%	11%
Financial liabilities, current	18%	15%	31%	31%	23%
Net Interest Bearing Debt	**27%**	**4%**	**-7%**	**-28%**	**77%**
Net Operating Assets	**308%**	**317%**	**329%**	**302%**	**325%**

RNOA breakdown by income type

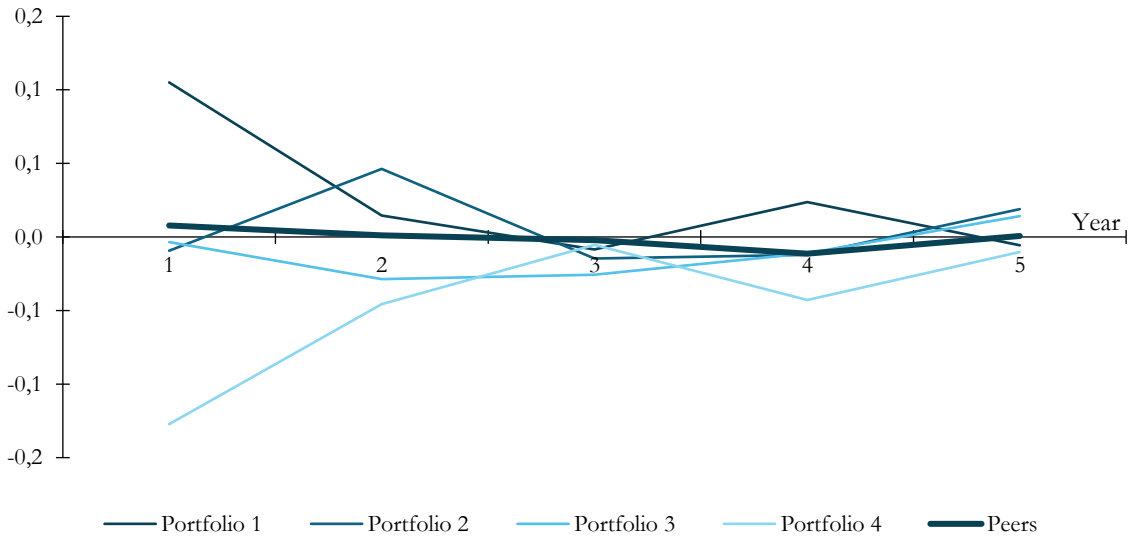


15.3 APPENDIX C: QUANTITATIVE INDUSTRY ANALYSIS

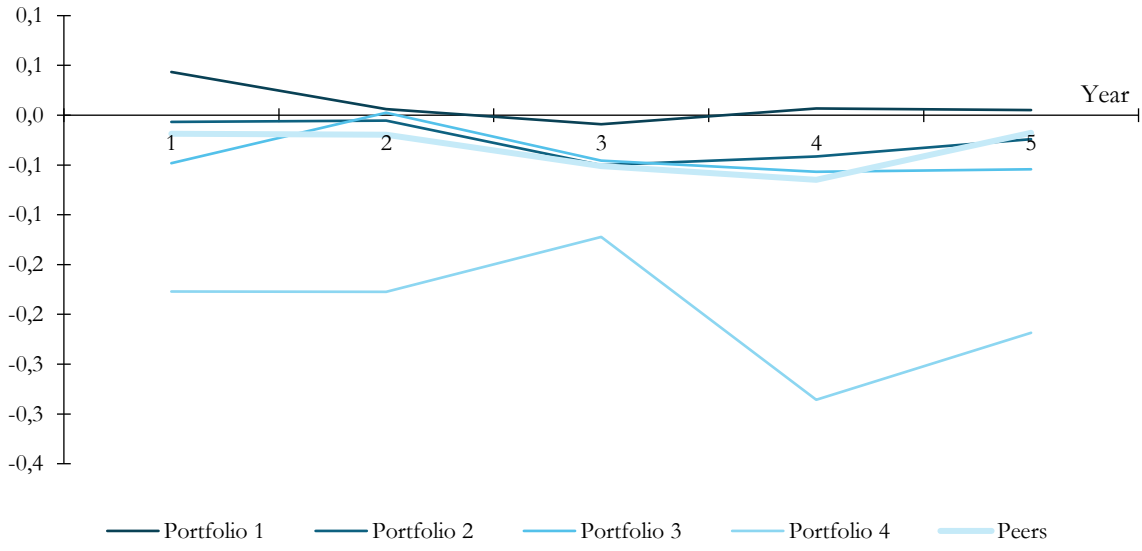
Wide Peer Group

BLOOMBERG SYMBOL	COMPANY NAME
PNDORA DC Equity	PANDORA A/S
TIF US Equity	TIFFANY & CO
SIG US Equity	SIGNET JEWELERS LTD
600086 CH Equity	EASTERN GOLD JADE CO LTD-A
PCJL IN Equity	PC JEWELLER LTD
600655 CH Equity	SHANGHAI YUYUAN TOURIST-A
590 HK Equity	LUK FOOK HOLDINGS INTL LTD
1929 HK Equity	CHOW TAI FOOK JEWELLERY GROU
900905 CH Equity	LAO FENG XIANG CO LTD-B
116 HK Equity	CHOW SANG SANG HLDG
002356 CH Equity	SHENZHEN HEMEI GROUP CO LT-A
UHR VX Equity	SWATCH GROUP AG/THE-BR
UA US Equity	UNDER ARMOUR INC-CLASS A
COH US Equity	COACH INC
HBI US Equity	HANESBRANDS INC
2313 HK Equity	SHENZHOU INTERNATIONAL GROUP
LULU US Equity	LULULEMON ATHLETICA INC
PVH US Equity	PVH CORP
1913 HK Equity	PRADA S.P.A.
KORS US Equity	MICHAEL KORS HOLDINGS LTD
RL US Equity	RALPH LAUREN CORP
BRBY LN Equity	BURBERRY GROUP PLC
600398 CH Equity	HEILAN HOME CO LTD -A
GIL CN Equity	GILDAN ACTIVEWEAR INC
LUX IM Equity	LUXOTTICA GROUP SPA
VFC US Equity	VF CORP
TTAN IN Equity	TITAN CO LTD
CRI US Equity	CARTER'S INC
1910 HK Equity	SAMSONITE INTERNATIONAL SA
002563 CH Equity	ZHEJIANG SEMIR GARMENT CO-A
494 HK Equity	LI & FUNG LTD
MONC IM Equity	MONCLER SPA
136 HK Equity	HENGTEN NETWORKS GROUP LTD
COLM US Equity	COLUMBIA SPORTSWEAR CO
BOSS GR Equity	HUGO BOSS AG -ORD
SFER IM Equity	SALVATORE FERRAGAMO SPA
KER FP Equity	KERING
002503 CH Equity	SOU YU TE GROUP CO LTD -A
002239 CH Equity	AOTECAR NEW ENERGY TECHNOL-A
PAG IN Equity	PAGE INDUSTRIES LTD
000587 CH Equity	JINZHOU CIHANG GROUP CO L-A
1027 HK Equity	CHINA JICHENG HOLDINGS LTD
KATE US Equity	KATE SPADE & CO
002699 CH Equity	MEISHENG CULTURE&CREATIVE -A
603555 CH Equity	GUIRENNIAO CO LTD-A
600400 CH Equity	JIANGSU HONGDOU INDUSTRY C-A
RJEX IN Equity	RAJESH EXPORTS LTD
LPP PW Equity	LPP SA
002425 CH Equity	KAISER CHINA CULTURAL CO L-A
2199 HK Equity	REGINA MIRACLE INTERNATIONAL
ABFRL IN Equity	ADITYA BIRLA FASHION AND RET
002269 CH Equity	SHANGHAI METERSBONWE FASH-A
3591 JP Equity	WACOAL HOLDINGS CORP
TED LN Equity	TED BAKER PLC
000982 CH Equity	NINGXIA ZHONGYIN CASHMERE-A
002173 CH Equity	INNOVATION MEDICAL MANAGEM-A
111770 KS Equity	YOUNGONE CORP
OVS IM Equity	OVS SPA
GIII US Equity	G-III APPAREL GROUP LTD
600061 CH Equity	SDIC ESSENCE HOLDINGS CO L-A
1402 TT Equity	FAR EASTERN NEW CENTURY CORP
002640 CH Equity	GLOBAL TOP E-COMMERCE CO-A
1476 TT Equity	ECLAT TEXTILE COMPANY LTD
600981 CH Equity	JIANGSU HIGH HOPE INTL GRP-A
600483 CH Equity	FUJIAN FUNENG CO LTD-A
ABNL IN Equity	ADITYA BIRLA NUVO LTD
NILE US Equity	BLUE NILE INC
BGI US Equity	BIRKS GROUP INC
DGSE US Equity	DGSE COMPANIES INC
CFPI US Equity	CALIFORNIA STYLE PALMS INC
BTOW US Equity	BELLTOWER ENTERTAINMENT CORP
EILL US Equity	ELEGANT ILLUSIONS INC
CFR VX Equity	CIE FINANCI-REG
ODMO US Equity	ODIMO INC

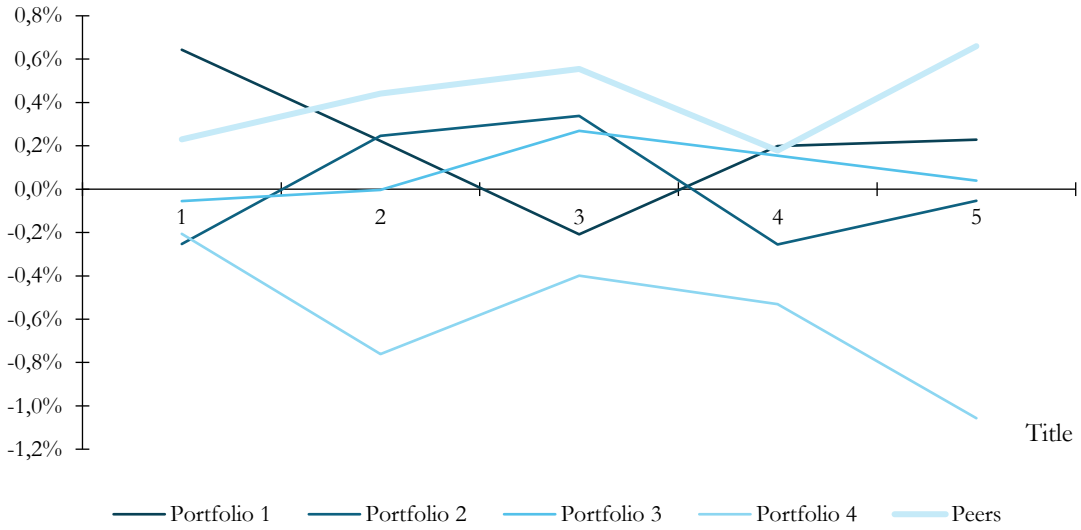
Changes in sales growth



Changes in Asset Turnover



Changes in Profit Margin



15.4 APPENDIX D: FORECASTING

Revenue per store category

Revenue forecast	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Concept Stores					9,719	12,724	19,416	24,486	29,884	35,954
Francise owned					5,670	6,096	7,733	8,664	9,066	9,011
Pandora owned					4,049	7,140	11,683	15,822	20,818	26,943
Shop-in-shops					2,418	2,740	3,596	4,031	4,440	4,837
Francise owned					1,956	2,072	2,511	2,757	3,024	3,281
Pandora owned					462	688	1,085	1,274	1,416	1,556
Multibranded retail					3,068	3,153	4,225	4,520	4,880	5,216
3rd Party					1,532	1,538	1,630	1,770	1,985	2,211
Total revenue	6,658	6,652	9,010	11,942	16,737	20,154	28,867	34,808	41,189	48,218

Numbers of stores breakdown

No. of stores	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Concept Stores	672	895	1,100	1,410	1,802	2,127	2,427	2,727	2,977	3,227
Pandora (O&O)	136	167	146	251	474	636	825	1,055	1,309	1,614
Francishe	*357*	*485*	*636*	*773*	829	972	1,068	1,128	1,114	1,055
3rd party	*179*	*243*	*318*	*386*	499	519	534	544	554	559
Shop-in-shops	1,182	1,265	1,372	1,555	1,674	1,889	2,044	2,134	2,214	2,289
Pandora (O&O)	51	56	60	68	116	156	186	206	216	226
Francishe	*754*	*806*	*875*	*991*	1,144	1,294	1,394	1,444	1,494	1,544
3rd party	*377*	*403*	*437*	*496*	414	439	464	484	504	519
Multibranded retail	-	-	-	-	5,795	5,395	5,395	5,445	5,545	5,645
Francishe					4,611	4,711	4,811	4,911	5,011	5,111
3rd party					1,184	684	584	534	534	534
Total Point of Sales	1,854	2,160	2,472	2,965	9,271	9,411	9,866	10,306	10,736	11,161

Changes in stores

Change in stores	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Concept Stores	251	223	205	310	392	**325**	**300**	**300**	**250**	**250**
Pandora (O&O)	79	31	-21	105	223	162	189	229	254	304
Francishe	115	128	151	137	56	143	96	61	-14	-59
3rd party	57	64	75	68	113	**20**	**15**	**10**	**10**	**5**
Shop-in-shops	224	83	107	183	119	215	155	90	80	75
Pandora (O&O)	6	5	4	8	48	**40**	**30**	**20**	**10**	**10**
Francishe	145	52	69	117	153	**150**	**100**	**50**	**50**	**50**
3rd party	73	26	34	58	-82	**25**	**25**	**20**	**20**	**15**
Multibranded retail	-3,981	-	-	-	5,795	-400	0	50	100	100
Francishe	-1,523	-	-	-	4,611	**100**	**100**	**100**	**100**	**100**
3rd party	-2,458	-	-	-	1,184	**-500**	**-100**	**-50**	**0**	**0**
Total Point of Sales	-3,506	306	312	493	6,306	140	455	440	430	425

Changes in revenue per store

Change in revenue per store	2016e	2017e	2018e	2019e	2020e
Concept Stores	9%	8%	7%	7%	6%
Francise owned	10%	7%	6%	6%	5%
Pandora owned	2%	7%	6%	6%	5%
Shop-in-shops	0%	8%	8%	7%	7%
Francise owned	-5%	7%	6%	6%	5%
Pandora owned	6%	7%	6%	6%	5%
Multibranded retail	15%	7%	6%	6%	5%
3rd Party	-4%	10%	10%	10%	10%

Revenue per store category (Q)

Revenue per store category (DKKm)	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4
Concept Stores	1,774	1,952	2,270	3,723	2,849	2,716	2,863	4,296
Francise owned	1,143	1,148	1,373	2,006	1,588	1,392	1,322	1,794
Pandora owned	631	804	897	1,717	1,261	1,324	1,541	3,014
Shop-in-shops	642	564	505	707	604	626	623	887
Francise owned	566	477	383	530	449	483	485	655
Pandora owned	76	87	122	177	155	143	138	252
Multibranded retail	764	709	809	786	883	703	739	828
3rd Party	367	373	327	465	404	282	387	465
Total Revenue	3,547	3,598	3,911	5,681	4,740	4,327	4,612	6,475

Numbers of stores (Q)

No. of stores	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4e
Concept Stores	989	1,046	1,149	1,256	1,333	1,386	1481	1,481
Francise owned	718	721	750	799	840	868	952	942
Pandora owned	272	325	399	457	493	518	529	619
Shop-in-shops	1,193	1,191	1,214	1,247	1,259	1,329	1400	1,462
Francise owned	1,115	1,101	1,109	1,131	1,142	1,211	1288	1,281
Pandora owned	78	91	105	116	118	119	112	156
Multibranded retail	5,422	5,236	5,094	4,811	4,511	4,256	4051	4,411

Changes in stores (Q)

No. of stores	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4e
Concept Stores	-	57	103	107	77	53	95	100
Francise owned	-	3	29	49	41	28	84	-10
Pandora owned	-	53	74	58	36	25	11	90
Shop-in-shops	-	-2	23	33	12	70	71	62
Francise owned	-	-14	8	22	11	69	77	-7
Pandora owned	-	13	14	11	2	1	-7	44
Multibranded retail	-	-186	-142	-283	-300	-255	-205	360

Revenue per store (Q)

Revenue per store	2015 Q1	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4e
Concept Stores	1.794	1.866	1.976	2.964	2.137	1.960	1.933	2.900
Francise owned	1.592	1.592	1.831	2.511	1.890	1.604	1.389	1.904
Pandora owned	2.320	2.474	2.248	3.757	2.558	2.556	2.913	4.868
Shop-in-shops	0.538	0.474	0.416	0.567	0.480	0.471	0.445	0.607
Francise owned	0.508	0.433	0.345	0.469	0.393	0.399	0.377	0.511
Pandora owned	0.974	0.956	1.162	1.526	1.314	1.202	1.232	1.618
Multibranded retail	0.141	0.135	0.159	0.163	0.196	0.165	0.182	0.188

Expense Forecast

DKKm	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Revenue	6,658	6,652	9,010	11,942	16,737	20,154	28,867	34,808	41,189	48,218
Cost of goods sold	-1,780	-2,202	-2,970	-3,470	-4,533	-5923	-10340	-12605	-13767	-18241
Gross Profit	4,878	4,450	6,040	8,472	12,204	14,231	18,527	22,203	27,422	29,977
Sales, distribution and marketing	-1,890	-1,982	-2,314	-3,008	-4,581	-5,499	-7,876	-9,497	-11,238	-13,156
Administration	-709	-813	-845	-1,170	-1,537	-2,065	-2,958	-3,566	-4,220	-4,940
EBITDA	2,279	1,655	2,881	4,294	6,086	6,668	7,694	9,140	11,964	11,881
Depreciation and Amortiation	-221	-180	-200	-222	-272	-473	-677	-817	-966	-1,131
EBIT	2,058	1,475	2,681	4,072	5,814	6,195	7,016	8,323	10,998	10,750
Tax on EBIT	-254	-276	-507	-823	-1781	-1276	-1446	-1715	-2266	-2215
Operating Income	**1,804**	**1,199**	**2,174**	**3,249**	**4,033**	**4,918**	**5,571**	**6,608**	**8,731**	**8,535**
Profit Margin	27.1%	18.0%	24.1%	27.2%	24.1%	24.4%	19.3%	19.0%	21.2%	17.7%

Expense forecast percent of revenue

Percent of revenue	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Revenue	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Cost of goods sold	-27%	-33%	-33%	-29%	-27%	-29%	-36%	-36%	-33%	-38%
Gross Profit	73%	67%	67%	71%	73%	71%	64%	64%	67%	62%
Sales, distribution and marketing	-28%	-30%	-26%	-25%	-27%	-27%	-27%	-27%	-27%	-27%
Administration	-11%	-12%	-9%	-10%	-9%	-10%	-10%	-10%	-10%	-10%
EBITDA	34%	25%	32%	36%	36%	33%	27%	26%	29%	25%
Depreciation and Amortiation	-3%	-3%	-2%	-2%	-2%	-2%	-2%	-2%	-2%	-2%
EBIT	31%	22%	30%	34%	35%	31%	24%	24%	27%	22%
Tax on EBIT	-4%	-4%	-6%	-7%	-11%	-6%	-5%	-5%	-6%	-5%
Operating Income	27%	18%	24%	27%	24%	24%	19%	19%	21%	18%

Gross-margin forecast

Gross margin	2015	2016e	2017e	2018e	2019e	2020e
Revenue	16,737	20,154	28,867	34,808	41,189	48,218
Cost of goods sold						
Franchise %	0.74	0.70	0.66	0.61	0.56	0.50
O&O %	0.26	0.30	0.34	0.39	0.44	0.50
"Base" Gross Margin	0.73	0.74	0.74	0.75	0.76	0.77
Gold price effect (NW)	0	-9.4%	2.1%	2.8%	4.3%	6.4%
Silver price effect (NW)	0	4.6%	11.2%	12.4%	10.0%	15.8%
Jeweler Wages (Thailand) (NW)	0	1.8%	1.8%	1.8%	1.8%	1.8%
"GSJ" effect (W)	0	3.2%	10.3%	11.4%	9.5%	14.8%
"Adj." Gross Margin	0	70.6%	64.2%	63.8%	66.6%	62.2%

Operating Expenses and Depreciation

Operating expense forecast	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Revenue	6,658	6,652	9,010	11,942	16,737	20,154	28,867	34,808	41,189	48,218
Sales, distribution and marketing	-1,890	-1,982	-2,314	-3,008	-4,581	-5,499	-7,876	-9,497	-11,238	-13,156
Administration	-709	-813	-845	-1,170	-1,537	-2,065	-2,958	-3,566	-4,220	-4,940
Operating expense	-2,599	-2,795	-3,159	-4,178	-6,118	-7,564	-10,834	-13,063	-15,458	-18,096

OPERATING EXPENSE FORECAST %

Percent of revenue	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Revenue	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sales, distribution and marketing	-28.4%	-29.8%	-25.7%	-25.2%	-27.4%	**-27.3%**	**-27.3%**	**-27.3%**	**-27.3%**	**-27.3%**
Administration	-10.6%	-12.2%	-9.4%	-9.8%	-9.2%	**-10.2%**	**-10.2%**	**-10.2%**	**-10.2%**	**-10.2%**
Operating expense	-39.0%	-42.0%	-35.1%	-35.0%	-36.6%	-37.5%	-37.5%	-37.5%	-37.5%	-37.5%

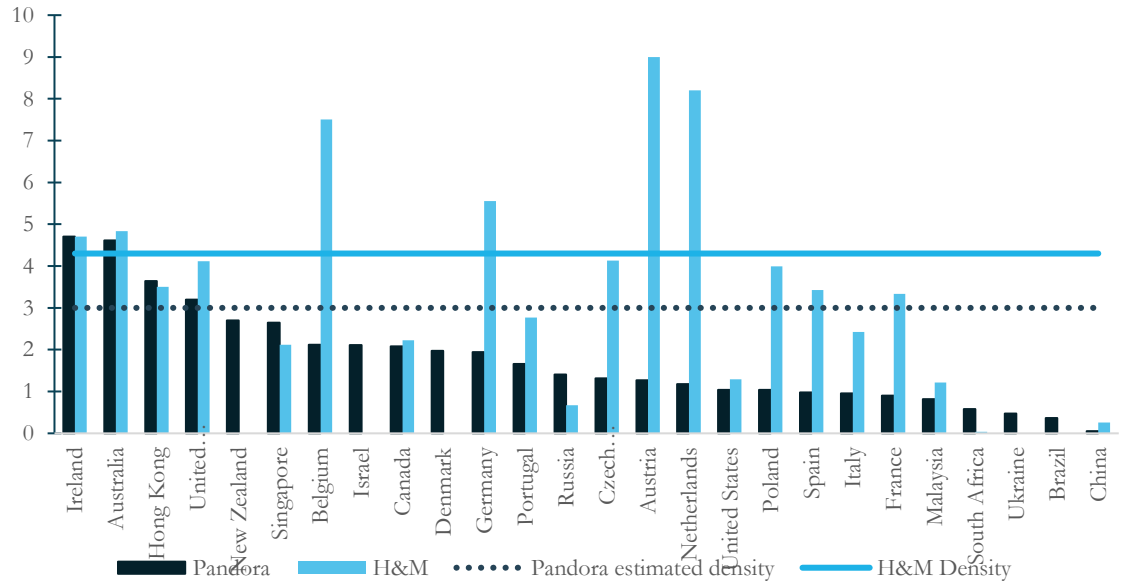
DEPRECIATION FORECAST

Depreciation forecast	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Depreciation, amortisation and imp	-18	-21	-41	-49	-11	-61	-88	-106	-125	-146
Depreciation, amortisation and imp	-163	-102	-83	-92	-141	-263	-376	-454	-537	-628
Depreciation, amortisation and imp	-40	-57	-76	-81	-120	-149	-213	-257	-305	-356
Total depreciation	-221	-180	-200	-222	-272	-473	-677	-817	-966	-1,131

DEPRECIATION FORECAST %

Percent of revenue	2011	2012	2013	2014	2015	2016e	2017e	2018e	2019e	2020e
Depreciation, amortisation and imp	-0.27%	-0.32%	-0.46%	-0.41%	-0.07%	-0.30%	-0.30%	-0.30%	-0.30%	-0.30%
Depreciation, amortisation and imp	-2.45%	-1.53%	-0.92%	-0.77%	-0.84%	-1.30%	-1.30%	-1.30%	-1.30%	-1.30%
Depreciation, amortisation and imp	-0.60%	-0.86%	-0.84%	-0.68%	-0.72%	-0.74%	-0.74%	-0.74%	-0.74%	-0.74%
Total depreciation	-3.32%	-2.71%	-2.22%	-1.86%	-1.63%	-2.35%	-2.35%	-2.35%	-2.35%	-2.35%

Concepts stores pr. 1m Inhabitants



15.5 APPENDIX E: TERM STRUCTURE OF INTEREST RATES

Danish Government Bonds

Name	ISIN	Coupon	Maturity	Year Fraction	Bid	Ask	Updated	Clean Mid Price	Dirty Mid Price	Nelson-Siegler (IR)	Theoretical Price
4% Danske Stat St. Lån 2017	DK0009921942	4.00%	15-11-2017	0.99	104.400	104.770	01-11-2016	104.585	104.563	-0.003	104.294
0.25% Danske Stat St. Låm 2018	DK0009923484	0.25%	15-11-2018	1.99	101.55	101.75	01-11-2016	101.650	101.649	-0.004	101.376
4% Danske Stat St. Lån 2019	DK0009922403	4.00%	15-11-2019	2.99	113.23	113.53	01-11-2016	113.380	113.358	-0.005	113.572
3% Danske Stat INK St. lån 2021	DK0009922676	3.00%	15-11-2021	4.99	115.810	116.180	01-11-2016	115.995	115.979	-0.004	117.163
1,5% Danske Stat St. Lån 2023	DK0009923054	1.50%	15-11-2023	6.99	109.72	110.13	01-11-2016	109.925	109.917	-0.002	111.744
7% Danske Stat St.lan 2024	DK0009918138	7.00%	10-11-2024	7.98	154.1	154.6	01-11-2016	154.350	154.216	0.000	156.830
1,75% Danske Stat St.lan 2025	DK0009923138	1.75%	15-11-2025	8.99	111.98	112.4	01-11-2016	112.190	112.180	0.001	114.800
4,5% Danske Stat ST.Lån 2039	DK0009922320	4.50%	15-11-2039	22.99	174.17	175.690	01-11-2016	174.930	174.905	0.014	166.988

*Excluded Goverment Bonds i due to ethier unrelavant maturity or low volume

Source: http://www.nasdaqomxnordic.com/bonds/denmark

Danish Swaps

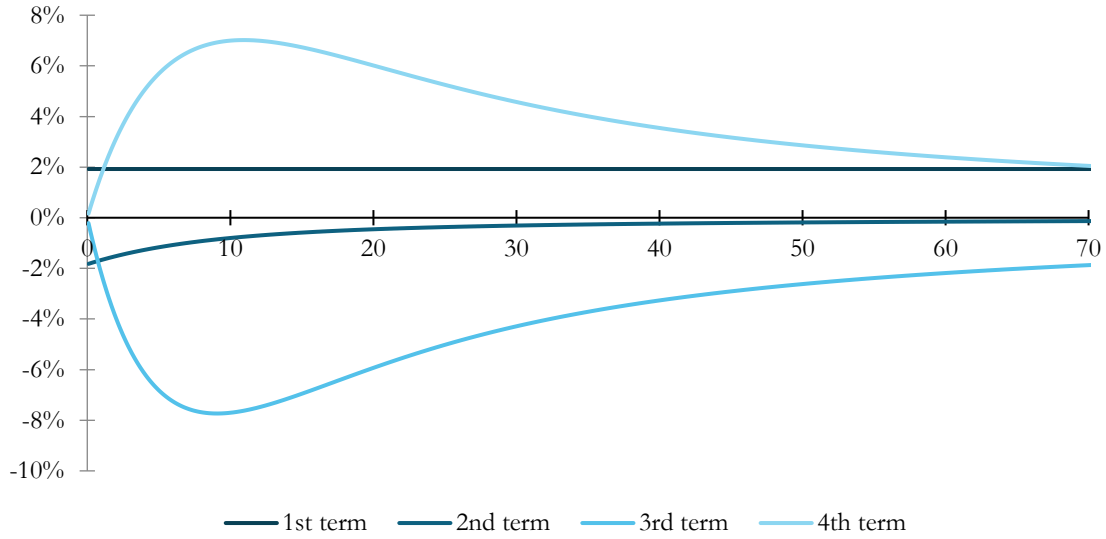
Coupon	Maturity	Bid	Ask	Clean Mid Price	Dirty Mid Price	Theoretical Price
-9E-05	17-11-2017	100	100	100	100	100.184
0.0006	17-11-2018	100	100	100	100	100.674
0.00159	17-11-2019	100	100	100	100	101.281
0.00259	17-11-2020	100	100	100	100	101.808
0.00374	17-11-2021	100	100	100	100	102.244
0.00491	17-11-2022	100	100	100	100	102.530
0.00605	17-11-2023	100	100	100	100	102.647
0.00723	17-11-2024	100	100	100	100	102.678
0.00832	17-11-2025	100	100	100	100	102.567
0.00931	17-11-2026	100	100	100	100	102.328
0.01095	17-11-2028	100	100	100	100	101.535
0.01262	17-11-2031	100	100	100	100	99.761
0.01388	17-11-2036	100	100	100	100	96.221
0.01425	17-11-2041	100	100	100	100	93.058
0.01423	17-11-2046	100	100	100	100	90.486

Source: Bloomberg L.P.

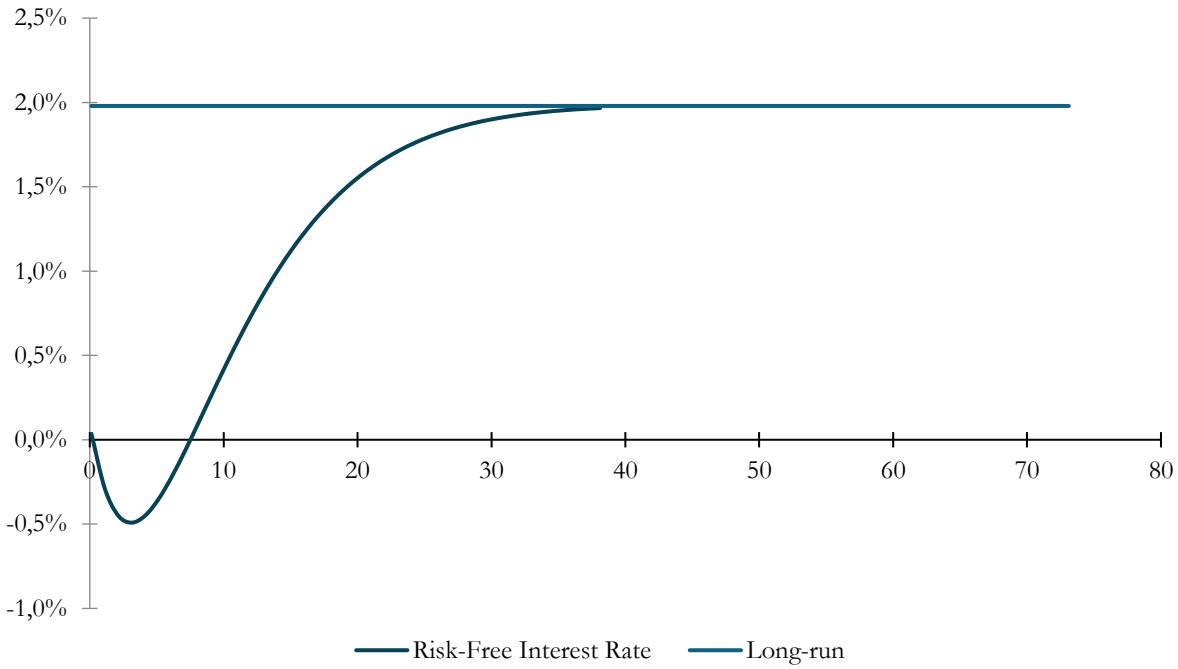
CITA Fixing	CITA ticker	Update Date
-0.45%	CITF01M	01-11-2016
-0.41%	CITF02M	01-11-2016
-0.42%	CITF03M	01-11-2016
-0.41%	CITF06M	01-11-2016
-0.41%	CITF09M	01-11-2016
-0.40%	CITF12M	01-11-2016

Source: http://www.nasdaqomxnordic.com/bonds/denmark/cita

Nelson-Siegel Parameters



Risk Free Interest Rate and Long-run rate



15.6 APPENDIX F: COST OF CAPITAL

Credit Rating (Moody's Framework)

Factor 1: Scale (10%)

	Aaa	Aa	A	Baa	Ba	B	Caa	Ca
Revenue($)	>100	50-100	25-50	3.5-25	3.5-10	1.5-3.5	0.25-1.5	<0.25

Factor 2: Business profile (30%)

Stability of Product (10%)	Products are absolute necessities for day-to-day living with virtually zero demand elasticity (gasoline and prescription drugs), with deferral of purchases rare regardless of macroeconomic or other cydical factors, which has been historically evidenced.	Products are highlynecessary for day-today living (essential food products), with deferral of purchases highly unlikely regardless of macroeconomic or other cydical factors, which has been historically evidenced. Highly inelastic demand, minimal fashion risk, technological obsolescence, and remote possibility of product substitution.	Products are moderately-necessary for day-to-day living, with deferral of purchases unlikely regardless of macroeconomic or other cydical factors. Moderately inelastic demand, and moderate levels of fashion risk or technological obsolescence, with some potential for product substitution.	Products are necessary, though deferral of purchases possible under certain macroeconomic or other cydical factors, which has been historically evidenced. Demand exhibits some signs of elasticity, fashion risk/technological obsolescence begins to surface, as does mild potential for product substitution.	Products begin to exhibit discretionary features, with some delay of purchases due to macroeconomic or cydical factors evident, and historically verifiable. Demand exhibits dear signs of elasticity, fashion risk/technological obsolescence is readily evident, as is moderate potential for product substitution.	Products are moderately discretionary, with easily-delayed purchases certain under even mild macroeconomic or cydical factors, and historically verifiable. Demand is elastic, fashion risk/technological obsolescence is acute, and product substitution is easy.	Products are highly discretionary or within a narrowly defined niche category with significantly delayed or eliminated purchases certain under even mild macroeconomic or cydical factors.	Products are absolutely discretionary, with elimination of purchases certain under even mild macroeconomic or cydical factors. Demand is highly elastic, fashion risk is absolute, and easily substituted by other broader retailers. Product category may be recently emergent or in significant secular decline.

Subfactor	**Aaa**	**Aa**	**A**	**Baa**	**Ba**	**B**	**Caa**	**Ca**
Execution and Competitive Position (20 %)	Flawless, best-indass execution and dominant positions in multiple broad markets across varying geographies, as well as within the company's product categories no matter the level of fragmentation. Online (where relevant) is growing and well-integrated, with company a bonafide multichannel retailer. No anticipated threats to current market position from any front.	Flawless, best-in-dass execution. Clear leader in multiple broad markets across varying geographies, as well as within the company's product categories no matter the level of fragmentation. Online (where relevant) is growing and wellintegrated, with company a bonafide multichannel retailer. Market position easily defended against any type of threat.	Generally flawless, world-dass execution. One of the leaders in multiple broad markets across varying geographies, as well as within the company's product category(ies) no matter the level of fragmentation. Online is growing and integrated, with company on its way to becoming a bonafide multi-channel retailer. Market position easily defended against almost any type of threat.	Execution is well-above peers. Leadership is evident in multiple markets across varying geographies, as well as within the company's product category(ies) with some potential fragmentation acknowledged. Online is growing and in early stages of integration, laying the groundwork for future multichannel capability. Market position can be defended against most types of threats, with even minor market share losses unusual.	Execution above peers. A leader in markets where company chooses to operate, as well as within the company's product category(ies), with some fragmentation evident. Online is growing and base-level capability for multichannel success is evident. Market position can be defended against most types of threats, however some level of market share erosion can occur.	Execution can be variable, but generally consistent with peers. Key competitor in markets where company chooses to operate, as well as within the company's product category(ies), with moderate levels of fragmentation evident. Online is growing and base-level capability is becoming evident, though ultimate multichannel capability is uncertain. Market position can generally be defended, however at times some market share erosion is expected.	Execution lags peers. Credible competitor in markets where company chooses to operate, as well as in company's product category(ies), which are typically highly fragmented. Online presence evident, though capability is rudimentary and sales penetration is minimal. Market position exhibits variability, with sustainability questionable with even moderate increase in competition.	Execution well below peers. Niche competitor at best in markets where company chooses to operate. Online presence not compelling. Little control over market position.

Factor 3: Leverage and Coverage (45%)

Sub factor	Aaa	Aa	A	Baa	Ba	B	Caa	Ca
EBIT/Interest expense	≥ 20x	12x - 20x	6x - 12x	4x - 6x	2.25x - 4x	1x - 2.25x	0.5x - 1x	<0.5x
RCF/Net Debt	≥ 100%	50% - 100%	35% - 50%	25% - 35%	12.5% - 25%	5% - 12.5%	0% - 5%	<0%
Debt/Ebitda	<0.75x	0.75x - 1.5x	1.5x - 2.5x	2.5x - 3.5x	3.5x - 4.5x	4.5x - 6.5x	6.5x - 8x	≥ 8x

Factor 4: Financial Policy (15%)

Financial Policy	Expected to have extremely conservative financial policies; very stable metrics; public commitment to very strong credit profile over the long term.	Expected to have very stable and conservative financial policies; stable metrics; minimal event risk that would cause a rating transition; public commitment to strong credit profile over the long term.	Expected to have predictable financial policies that preserve creditor interests. Although modest event risk exists, the effect on leverage is likely to be small and temporary; strong commitment to a solid credit profile.	Expected to have financial policies that balance the interest of creditors and shareholders; some risk that debt funded acquisitions or shareholder distributions could lead to a weaker credit profile.	Expected to have financial policies that tend to favor shareholders over creditors; above average financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.	Expected to have financial policies that favor shareholders over creditors; high financial risk resulting from shareholder distributions, acquisitions or other significant capital structure changes.	Expected to have financial policies that create elevated risk of debt restructuring in varied economic environments.	Expected to have financial policies that create elevated risk of debt restructuring even in healthy economic environments.

15.7 APPENDIX G: GE RISK-ADJUSTMENTS

NIPA Sections used

NIPA "Section"	Code	Title
2	20100	Table 2.1. Personal Income and Its Disposition
2	20406	Table 2.4.6. Real Personal Consumption Expenditures by Type of Product, Chained Dollars
2	20304	Table 2.3.4. Price Indexes for Personal Consumption Expenditures by Major Type of Product

Consumption Index

Data to construct The Real Consumption Index

CONSUMPTION

[Billions of chained (2009) dollars]		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Nondurable goods	DNDGRX1	1806	1863.6	1896	1931.1	1998.5	2063.7	2132.3	2202.2	2239.3	2214.7	2175.1	2223.5	2263.2	2277.5	2316.1	2376.4	2439.3
Services	DSERRX1	5331.6	5599.3	5731	5838.2	5966.9	6156.6	6353.4	6526.6	6656.4	6708.6	6648.5	6727.6	6851.4	6908.1	6951.3	7114.2	7310.3
Total		7137.6	7462.9	7627	7769.3	7965.4	8220.3	8485.7	8728.8	8895.7	8923.3	8823.6	8951.1	9114.6	9185.6	9267.4	9490.6	9749.6

PRICE INDEX

[Index numbers, 2009=100]		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Nondurable goods	DNDGRG3	79.248	82.651	83.529	83.538	85.264	88.214	91.592	94.438	97.214	102.653	100	103.085	109.188	111.84	111.946	112.595	108.92
Services	DSERRG3	75.404	77.502	79.88	81.969	84.533	87.058	89.933	92.976	95.981	98.947	100	101.661	103.524	105.84	108.276	110.946	113.149
Weighted Inflation		76.376633	78.78778	80.78711	82.35898	84.71641	87.34821	90.34988	93.34485	96.29138	99.8668	100	102.0147	104.9304	107.3277	109.1932	111.3589	112.09093

POPULATION

(midperiod, thousands) \6\		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Population (midperiod, thousands)	B230RC0	279,328	282,398	285,225	287,955	290,626	293,262	295,993	298,818	301,696	304,543	307,240	309,807	312,169	314,490	316,796	319,233	321,704
Billions		0.279328	0.282398	0.285225	0.287955	0.290626	0.293262	0.295993	0.298818	0.301696	0.304543	0.30724	0.309807	0.312169	0.31449	0.316796	0.319233	0.321704

Calculations		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RIR		0.1314632	0.115525	0.062543	0.017559	0.084649	0.063545	0.082539	0.100818	0.098277	-0.05124	0.129105	0.182919	0.1323	0.079943	0.141685	0.217548	0.2411824
Inflation (pi)			0.031081	0.025059	0.01927	0.028222	0.030593	0.033787	0.032611	0.031078	0.036459	0.001333	0.019947	0.02818	0.022589	0.017232	0.01964	0.006552
ACC		7137.6	7462.9	7627	7769.3	7965.4	8220.3	8485.7	8728.8	8895.7	8923.3	8823.6	8951.1	9114.6	9185.6	9267.4	9490.6	9749.6
CI		8.1799847	8.224552	8.246303	8.264788	8.289715	8.321215	8.35299	8.381236	8.400176	8.403274	8.392038	8.406385	8.424486	8.432245	8.441111	8.46491	8.4918344
c			879450	1293922	63029482	1002828	920165.7	852351.3	897204.9	949818.5	857390.1	1773816	1554414	1334642	1294582	8681758	2202578	927220.24
p		76.376633	78.78778	80.78711	82.35898	84.71641	87.34821	90.34988	93.34485	96.29138	99.8668	100	102.0147	104.9304	107.3277	109.1932	111.3589	112.09093
ci				23.6876	24.19718	32.35056	24.14969	24.07694	23.8884	23.94283	24.21647	20.70287	24.86261	24.94408	24.41806	24.08644	28.02326	24.182301
pn			0.042045	0.010567	0.000108	0.020451	0.034013	0.037578	0.0306	0.028971	0.05444	-0.02618	0.030384	0.057517	0.023998	0.000947	0.005781	-0.033184
ps			0.027443	0.030222	0.025816	0.030801	0.029433	0.03249	0.033276	0.031809	0.030434	0.010586	0.016474	0.01816	0.022125	0.022755	0.02436	0.0196619
Ci equation																		
v	0.02				0.50958	8.153385	-8.20087	-0.07275	-0.18854	0.054424	0.273644	-3.51361	4.159745	0.081466	-0.52602	-0.33162	3.936821	-3.840957
diff					0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.035336	0.0353359
Innovations (CI)					0.474244	8.118049	-8.23621	-0.10809	-0.22387	0.019088	0.238309	-3.54894	4.124409	0.04613	-0.56136	-0.36696	3.901485	-3.876293

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
RIR Innovations		-0.1232	-0.09474	-0.06506	-0.08738	-0.00669	0.086037	0.080693	-0.02856	0.035256	0.017065	0.036902
sigma	0.0317											