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Prognózy ekonomické přidané hodnoty v zábavním průmyslu
Forecasting of Economic Value Added in Entertainment Industry

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Contents

1. Introduction

Today, the development of the corporate sector is affected by increasingly fierce competition, the implementation of mergers and acquisitions, globalization trends and the opening of new markets. During the COVID-19 pandemic, many companies are inevitably limited in their development. For company managers, on the one hand, it is necessary to combat against the increase in corporate cost caused by the COVID epidemic but the reduction in production capacity, and on the other hand, it is necessary to consider the long-term development of the company's performance when the epidemic eases.

In the process of evaluating the success of a company, the concepts of company performance, performance measurement, and company value management become important. In measuring business performance, it is necessary to examine the adaptability of the company to economic development and to achieve greater competitiveness. There has been a transition in recent years from traditional performance indicators towards market value preference. The new concept of financial management is based on Shareholder Value management. This concept is based on modified financial indicators that allow you to better identify processes and activities that increase shareholder value as well the total value of the company.

Approaches to measuring performance are constantly evolving and indicators measuring this performance can be divided into the following categories: accounting, economic and market indicators. To the indicators economic is economic value added (EVA), which is recently relatively high attention. Economic added value is a measure of performance company which aims to motivate managers to increase shareholder value. In performance management, it is important for the company not only to evaluate past and present developments, but also to evaluate future developments. But this future development is combined with uncertainty and a certain degree of risk, which is very difficult to quantify.

The aim of the thesis is to evaluate the past performance and predict the future financial performance on the basis of real data of the entertainment company, Ubisoft Entertainment SA. The past financial performance evaluation is based on the time interval from 2011 to 2020.

The prediction of economic value added is based on the financial plan by using Monte Carlo simulation.

This diploma thesis is divided into five chapters. The first chapter is the introduction. The second part is focused on the financial analysis and performance measures, which includes the characteristics of the indicator of economic value added and its calculation, and describes the principles of determining the cost of capital and briefly characterizes the market value added indicator.

The third chapter of the thesis explains the methods of predicting financial indicators using stochastic processes. Subsequently, the Monte Carlo simulation method and other steps used in the prediction are explained.

The fourth chapter is about financial performance evaluation of Ubisoft Entertainment SA. It can be divided into three parts. The first part is about the financial performance evaluation of the company from 2011 to 2020 based on economic value added. We calculated the historical economic value added and then performed the pyramidal decomposition and influence quantification. The second part is about prediction of economic value added. We predicted the revenues based on Monte Carlo simulation, and then made a financial plan to predict the income statement and the equity. The estimation of cost of equity was based on CAPM (capital asset pricing model), and we applied exponential weighted moving average for the prediction of market risk premium and beta coefficient, the risk free rate was using the government 1 year bond rate and it was fixed. Then the economic value added prediction was based on the constructed financial plan and predicted cost of equity. Lastly there is a sensitivity analysis. In the third part, there is a summary of the financial evaluation, which contains the views on past performance, the possibility for its future and some recommendations.

In the last chapter, we made a conclusion to the whole thesis.

2. Financial Analysis and Performance Measures

There are a number of indicators to measure business performance. These indicators can be divided into three basic groups, according to the strength of the influence of financial markets and the degree of connection of accounting value with market value. So that there are accountant indicators, economic indicators and market indicators.

Accounting indicators, which usually called as the financial KPIs (key performance indicators), seen from the financial statements, are metrics organizations use to track, measure, and analyze the financial health of the company. For example, profit indicators (EAT, EBIT, EBITDA, EPS) and profitability ratios (ROA, ROE, ROCE).

The disadvantage of the mentioned accounting indicators is that the development of profitability does not have to correlate with the creation of value for owners. This gave rise to economic indicators, which include net present value (NPV) and economic value added (EVA), which give a macroeconomic measurement used by analysts to understand current and future economic activity and opportunity.

The last group of indicators for measuring the company's performance is market indicators. These performance indicators are quantitative in nature and seek to interpret stock or financial index data in an attempt to forecast market moves, which can evaluate the company from a market perspective and are very sensitive to stock market developments. Market indicators include market value added (MVA) and total shareholder return.

This chapter describes the economic value added as an indicator of measuring the company's performance and sets out the methods for calculating the indicator. Subsequently, the market value added indicator is very briefly characterized, which deals with the same issues as economic value added. Furthermore, the costs of capital are defined. The last part of the chapter focuses on the pyramid decomposition of economic value added.

2.1 Theoretical basis of financial performance evaluation

2.1.1 Corporate value theory

Professor Modigliani and Miller (1950s) have made new breakthroughs in the study of corporate value. Based on the tax-free model of MM theory (The American Economic Review, 1958), they have given a definition and a certain measurement of the connotation of corporate value with the capital structure. According to the connotation of MM theory, company value is the present value of the cash flow created in the future economic activities of the company, and the formula is expressed as: VU = VL = EBIT/KWACC.

In this model, VU represents no debt corporate value, VL represents the corporate value in debt, EBIT represents the earnings before interest and tax, and KWACC represents the cash flow created in the business process of the corporate, if the corporate's cash flow increases, the value of the corporate will be greater, which means KWACC is the capitalization ratio of the present value of the corporate's future cash flow. The size of this indicator determines the size of the company risk. The result is that the cash flow can be used as the result of the business activities of the company, and the company value can be used as the capitalization of the future cash flow of the company.

2.1.2 Principal-agent theory

American economists Milton and Gardner (1930s) have observed that the practice when running the company has great disagreement between business owners and managers, so they put forward this theory, which is based on the game theory based on asymmetric information. The most important thing of principal-agent theory is to take two basic assumptions as the premise, one is that there is a certain conflict of benefits between the principal and the agent, and the other is that the information between the principal and the agent is asymmetric.

Principal-agent theory is based on the model in neoclassical economics, and it follows the hypothesis of economic man as the core. In accordance with an explicit or implicit contract in economic activities, one or more economic entities hire another economic agent to provide services for them, and at the same time grant the latter the decision-making authority, the latter in accordance with the quality and quantity requirements of the services provided the owner pays the corresponding remuneration.

Therefore, due to the conflict of benefits between the principal and the agent, it is necessary to seek incentive factors and design the optimal incentive mechanism to alleviate the deepening of the principal-agent problem.

2.1.3 Stakeholder theory

Stakeholder theory was gradually developed in Western countries around the 1960s, and its influence expanded rapidly after entering the 1980s, and it began to influence the choice of corporate governance models in the United States and other countries, and promoted the transformation of corporate management methods. The theory started with externally controlled companies. At the beginning of the period, the theory proposed that company development is the process by which stakeholders participate in the management of the company. It defines that stakeholders are the appealing parties for the expression of interests.

Stakeholders include corporate shareholders, creditors, employees, consumers, suppliers and other trading partners, as well as government departments, local residents, local communities, media, environmentalism and other pressure groups, and even include the natural environment, human descendants, etc. The object directly or indirectly affected by the business activities of the company.

At present, stakeholder theory can be roughly divided into two categories: one is a narrow stakeholder, which is defined as: who believes that stakeholders have invested in some values such as company paid-in capital and human resources. Goods also bear certain risks. From another perspective, they also bear risks because of the economic activities of the company. Another type of broad stakeholder theory, represented by R. Edward Freeman (a stakeholder approach, 1984), believes that Stakeholder management theory refers to the management activities carried out by the business managers to comprehensively balance the interests of various stakeholders.

2.2 Characteristics of economic value added

The concept of Economic Value Added (EVA) is gradually becoming part of corporate planning and monitoring the company's performance in advanced market transforming economies. Economic value added is listed among the economic indicators, which, unlike

accounting indicators, considering all the costs of invested capital, the time horizon and the risk factor.

The economic value added indicator is used primarily to evaluate the company's success from the company's point of view, where the company's internal information is used as the initial data.

2.2.1 Introduction of EVA theory

Economic Value Added (EVA) is equal to the difference between the net operating income after tax and the total cost of capital. It is a measure of the value and wealth created by market economic organizations. Stern Stewart & comp (1990) put forward the performance evaluation index, which is an innovation to the theory of financial performance evaluation index, and it has quickly been widely used all over the world. The traditional profit calculation input cost only considers the accounting statement profit formed after the interest borne by the debt capital of the company is deducted. This calculation method generally assumes that the owner of the shareholder does not need to bear the cost of the capital invested in the company, so that it ignores the opportunity cost of equity capital of the owners. For corporate shareholders, the opportunity cost also can be seen as the losses and gains. The Economic Value Added Index (EVA) comprehensively considers the cost of capital invested by the owner of the company. Compared with the traditional accounting index, it has a great advantage. At the same time, many adjustments have been made to the statement profits calculated in accordance with the general accounting standards, which can more accurately reflect the value added by the company. If the economic value-added is greater than zero, it can indicate that the company has created value-added; if the economic value-added is less than zero, it reflects that the cost invested by investors has not been effectively compensated and the company has failed to achieve value creation.

The general formula of EVA is:

$$EVA = NOPAT - WACC \times TC \tag{2.1}$$

where NOPAT represents the net operating profit after tax, WACC represents the weighted average cost of capital, TC represents the total capital.

Among them:

$$NOPAT = operating\ profit\ before\ tax - EVA\ tax\ adjustment \tag{2.2}$$

$$TC = total\ capital\ invested = equity\ capital + debt\ capital \tag{2.3}$$

EVA of equity is based on the return on equity, which is calculated as:

$$EVA = (ROE - R_e) \cdot E \tag{2.4}$$

where R_e is the cost of equity and E is the equity.

From the above concept introduction, it can be seen that there is a certain consistency in the construction of economic value-added and residual income. At the same time, there has been great progress. From the point of view of the selection of calculation indicators, economic value-added not only considers equity capital, but also considers the cost of debts capital, which are the main two aspects of corporate funding sources. EVA converts the profits on the accounting statements into economic profits, and uses the capital asset pricing model to calculate the cost rate of equity capital.

2.2.2 Accounting adjustments of EVA theory

The goal of accounting adjustments is to use economic profits while taking into account the economic value of corporate assets, so as to make up for the various deficiencies in accounting profits. Stern Stewart & comp (1990) stated that they have done more than 160 item adjustments. Now the often-used adjustment items are described as follows:

(1) Adjustment of net operating profit after tax

NOPAT (Net Operating Profit After Tax) shows that the operating profit cannot be simply calculated based on the net profit on the financial statement. The net operating profit after tax must be determined after the net profit on the financial statements is deducted from the income tax and then the corresponding accounting items are adjusted. On the surface, its calculation should not include non-operating income and non-operating expenditure items. For example, long-term research and development costs, it is difficult to see the economy

benefits that it may bring to the company in a short period of time, but in the accounting statement it has a very large one-time expenditure in the profit and loss category, and its profit period is very long. This type of long-term investment cost is very beneficial to the long-term development of the company, and the future value is also very potential. EVA capitalizes this part of the cost and handles it in the form of long-term amortization. The cost was extended for five years.

(2) Adjustment of total capital

Total capital mainly includes equity capital invested by owners and debt capital invested by creditors. Here gives two main examples.

Non-interest-bearing current liabilities are mainly accounting items that do not require additional interest payments for daily operations, such as accounts payable, interest payable, employee compensation payable, taxes payable, etc. Because these accounting items do not occupy the company's funds, and there is no need to pay a certain amount of interest expenses when using this part of the funds, these items need to be deducted when calculating the total cost of capital.

Construction in progress is the capital construction investment of some factories in order to expand the scale of business during the development process. It does not bring actual profits to the company. From the perspective of the overall investment of the company, it is not considered as substantial. Investment should be deducted from the cost of capital.

2.2.3 Financial performance evaluation based on EVA

Economic value-added is a powerful method of financial performance evaluation. The purpose is to evaluate how much value the business operators can create for the company by using capital, and it can also accurately reflect the long-term development goals of the company in the future. Therefore, when economic value added is introduced into business management, EVA's financial performance evaluation system can better reflect the business results of the company, accurately calculate the economic value created by the company, and can also fully reflect the cost of capital of the company. Then, it can form a long-term mechanism to provide the basis for economic decision-making, it can also make up for the

potential risks of accounting profits that may be manipulated, and ultimately improve the core competitiveness of the company.

In addition, EVA can also combine with non-financial indicators to evaluate the performance of company, which can comprehensively build a corporate performance evaluation indicator system and assist business owners and shareholders to understand how the corporate resource allocation is, help in making business decisions and investment decisions.

2.3 Characteristics of market value added

The market value added indicator (MVA) belongs to the group of market indicators used to evaluate the company's performance. As with the economic value added indicator, the creator is Stern Stewart & comp.

Market value added represents the difference between the current market value of a firm and the capital contributed by investors. If MVA is positive, the company has added value. If it is negative, the company losses value. The amount of value added needs to be greater so than the company's investors could have achieved investing in the market portfolio, adjusted for the leverage (beta coefficient) of the firm relative to the market. In essence, it is also possible to use market value added to determine whether a company creates shareholder value. If the market value of the company is greater than the amount of capital invested in it, then the company creates value for shareholders. Otherwise, not. Therefore, it is typical for successful companies that they increase their market added value, and thus increase the value of the capital invested in them.

The market value added indicator can be determined on the basis of various relationships. On the basic definition of MVA, the calculation as follows

$$MVA = MV - C \tag{2.5}$$

where MV is the market value of the firm, including the value of the firm's equity and debt, and C is the capital invested in the firm.

On the basis of a narrow definition, which is a simplified version, market value added can be calculated as follows,

$$MVA = MVE - BVE \tag{2.6}$$

where MVE is the market value of equity, and BVE is the book value of shareholders' equity.

Market value added can be also determined as the present value of future economic value added, and the defined as follows,

$$MVA = PV(EVA) = \sum_t^T EVA_t \times (1+R)^{-t} \tag{2.7}$$

From the formula (2.6), we can see that there is a certain direct proportional relationship between MVA and EVA. If the economic value added is positive, an increase in prices can be observed over time, if the economic value added is negative, there's record of a decrease in stock prices. Therefore, if the economic value added is positive, market value added is also positive and vice versa.

It should be noted that these two indicators both can describe the performance of company, but from different perspective point of view. Economic value added uses internal information to evaluate the company's success, that is, to evaluate the company performance from the perspective of the company. However, in terms of market added value, it uses the stock prices as very important parameter for evaluation, so the company is evaluated from a perspective of the market.

2.4 Determination of costs of capital

In order to calculate the amount of economic added value, it is an important step in determining the cost of capital. The company's cost of capital can be represented as the investors' required rate of return, which can be seen as the two different perspectives of view. The cost of capital from the point of view of the company can be understood as the price for capital obtained for further development of the activity. However, from the investors' point of view, this is a required profitability that must be achieved by the company in order to avoid a decrease in value for investors. The cost of capital can be divided into following three parts.

2.4.1 Cost of total capital

The weighted average cost of capital (WACC) is the rate that a company is expected to pay on average to all its security holders to finance its assets. The WACC is commonly referred to as the firm's cost of capital. Importantly, it is dictated by the external market and not by management. The WACC represents the minimum return that a company must earn on an existing asset base to satisfy its creditors, owners, and other providers of capital, or they will invest elsewhere. In addition, companies can use WACC to see if the investment projects available to them are worthwhile to undertake.

Companies raise money from a number of sources, so that WACC is calculated taking into account the relative weights of each component of the capital structure. The more complex the company's capital structure, the more laborious it is to calculate the WACC, usually the calculation of WACC defined as follows,

$$WACC = \frac{R_D(1-t)\cdot D + R_E \cdot E}{D+E} \tag{2.8}$$

where R_D is the cost of interest-bearing debt, t is the income tax rate, D is interest-bearing debt, R_E is the cost of equity, E is equity, and C = D + E is total invested capital.

2.4.2 Cost of debt

When companies borrow funds from outside lenders, the interest paid on these funds is called the cost of debt. The cost of debt is computed by taking the rate on a risk-free bond whose duration matches the term structure of the corporate debt, then adding a default premium. This default premium will rise as the amount of debt increases (since, all other things being equal, the risk rises as the cost of debt rises). Since in most cases debt expense is a deductible expense, the cost of debt is computed on an after-tax basis to make it comparable with the cost of equity (earnings are taxed as well). Thus, for profitable firms, debt is discounted by the tax rate. The formula as follows,

$$R_D = (R_f + credit\ \ risk\ \ rate) \cdot (1 - tr) \tag{2.9}$$

where tr is the corporate tax rate and R_f is the risk free rate.

2.4.3 Cost of equity

The cost of equity is the return firm theoretically pays to its equity investors, i.e., shareholders, to compensate for the risk they undertake by investing their capital. Firms need to acquire capital from others to operate and grow. Individuals and organizations who are willing to provide their funds to others naturally desire to be rewarded. Just as landlords seek rents on their property, capital providers seek returns on their funds, which must be commensurate with the risk undertaken.

The cost of equity is usually higher than the cost of debt. The reason for this is that the owner bears a higher risk than the creditor when investing in the company. The owner's funds are invested indefinitely, the yield is not certain in advance and depends on the economic situation of the company. The second reason is the tax deductibility of interest expenses.

The cost of capital can be determined on the basis of market methods or on the basis of accounting methods. The following methods are used to determine the cost of equity,

(1) Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) describes the relationship between systematic risk and expected return for assets, particularly stocks. CAPM is widely used throughout finance for pricing risky securities and generating expected returns for assets given the risk of those assets and cost of capital. The formular of CAPM can be defined as follows,

$$E(R_E) = R_F + \beta_E \cdot [E(R_M) - R_F] \tag{2.10}$$

where $E(R_E)$ is the expected return on equity, R_F is the risk-free rate, β_E is the coefficient of the sensitivity of the additional return on equity to the additional return on the market portfolio, and $E(R_M)$ is the expected return on the market portfolio.

(2) Arbitrage Pricing Model (APM)

Arbitrage pricing theory (APT) is a multi-factor asset pricing model based on the idea that an asset's returns can be predicted using the linear relationship between the asset's expected return and a number of macroeconomic variables that capture systematic risk. It is a

useful tool for analyzing portfolios from a value investing perspective, in order to identify securities that may be temporarily mispriced.

The arbitration pricing model is defined as follows,

$$E(R_E) = R_F + \sum_j \beta_{Ej} \cdot \left[E(R_j) - R_F\right] \tag{2.11}$$

where β_{Ej} is the sensitivity coefficient of the additional return on equity to the additional return of the j-th factor, $E(R_j)$ is the expected yield of the j-th factor.

(3) Dividend discount model

The dividend discount model (DDM) is a quantitative method used for predicting the price of a company's stock based on the theory that its present-day price is worth the sum of all of its future dividend payments when discounted back to their present value. It attempts to calculate the fair value of a stock irrespective of the prevailing market conditions and takes into consideration the dividend payout factors and the market expected returns. If the value obtained from the DDM is higher than the current trading price of shares, then the stock is undervalued and qualifies for a buy, and vice versa.

The Gordon growth model (GGM) is a popular and straightforward variant of the DDM, and according to Gordon growth model with constant dividend growth, the relationship can be defined as follows,

$$R_E = \frac{DIV}{P} + g \tag{2.12}$$

where DIV is the dividend, P is the market price of the stock and g is the dividend growth rate.

(4) Modular model

The use of modular models mainly concerns economies whose capital market is perfect and a market economy has a short period of operation. There are a large number of variants of these models.

The unleveraged cost of capital ($WACC_U$) of a company is formulated as follows,

$$WACC_U = R_E^U = R_F + R_{POD} + R_{FINSTAB} + R_{LA} \tag{2.13}$$

where R_F is the risk-free rate, R_{POD} is the risk premium for the business risk of the company, $R_{FINSTAB}$ is a risk premium for financial stability and R_{LA} is the risk premium for the size of the business.

So the leveraged cost of capital ($WACC_L$) of a company is formulated as follows,

$$WACC_L = WACC_U \cdot (1 - \frac{D}{A} \cdot tr) \tag{2.14}$$

In another word, the cost of capital can be seen as the $WACC_U$ and the risk from the financial structure, which means the proportion of debt and equity. The $WACC_L$ is the cost of capital of a leveraged company, which is the R_E, the expected return for investors and the expected cost for company, so the result as follows,

$$R_E = WACC_U + R_{FINSTRU} = R_F + R_{POD} + R_{FINSTAB} + R_{LA} + R_{FINSTRU} \tag{2.15}$$

where $R_{FINSTRU}$ is the risk premium for the financial structure.

2.5 Pyramidal Decomposition of EVA Equity

In order to find out the factors that drive the economic value added, pyramidal decomposition can be applied. The three components in the equation are return on equity, cost of equity and equity. Return on equity is not only a profitability ratio, but it can also reflect a company's leverage, liquidity and operating efficiency. It can be decomposed as follows:

$$ROE = \frac{EAT}{Rev} = \frac{EAT}{EBT} \cdot \frac{EBT}{EBIT} \cdot \frac{EBIT}{Rev} \cdot \frac{Rev}{A} \cdot \frac{A}{E'} \tag{2.16}$$

where EAT is earnings after taxes, Rev is revenue, EBT is earnings before taxes, $EBIT$ is earnings before interests and taxes, A is assets. Return on equity also can be expressed as:

$$ROE = Tax\ \ burden \cdot Interest\ \ burden \cdot EBIT\ \ margin \cdot Total\ \ assets\ \ turnover \cdot Financial\ \ leverage \tag{2.17}$$

Tax burden is the ratio of earnings after taxes to earnings before taxes. The higher ratio means smaller tax burden of a company, leads to a higher return on equity as well as economic value added.

Interest burden is the ratio of earnings before taxes to earnings before interest and taxes. The higher ratio indicates the less interest paid, the cost of debt doesn't bring too much burden to the company.

EBIT margin is the earnings before interest and taxes over revenues. Higher EBIT margin means higher profitability from a company. EBIT excludes the cost of interest and taxes from the profitability measure. A firm's activity contains operating activities and non-operating activities.

Revenues, cost of goods sold, operating expense which contains marketing expense and administrative expense are relates to the operating activities. Operating profit is the net of revenues after subtracting cost of goods sold and operating expense. Non-operating profit is the net of non-operating income after subtracting non-operating cost. The sum of operating profit and non-operating profit is the earnings before interest and taxes.

Total assets turnover is the revenues divided by assets. It measures a company's efficiency by using its assets to generate revenues. The higher ratio indicates a higher efficiency of assets utilization.

The assets consist of long term assets and short term assets. Long term assets can be further decomposed into financial investment, tangible assets, and intangible assets. Short term assets contain cash and cash equivalents, accounts receivables, accounts prepayment and inventory.

Financial leverage is the ratio of assets to equity. It reflects a company's capital structure. A high financial leverage ratio means more debt financing a firm uses, it also means more interest payment of a company.

3. Selected Methods of Forecasting

In this chapter, we will description of the methodology that was applied in the practical part of the thesis. The theories described in this chapter are based on Podding and Varmaz (2008), Hitchner (2011), Dluhosova (2014), Zmeskal (2004).

3.1 Cost of Capital

The cost of equity is the return that a company requires to decide if an investment meets capital return requirements. The cost of equity refers to two separate concepts, depending on the party involved. If you are the investor, the cost of equity is the rate of return required on an investment in equity. If you are the company operator, the cost of equity determines the required rate of return on a particular project or investment, which is the minimal required rate of return on capital. Companies finance assets are composed by employing debt and equity, which means the capital structure influences the cost of capital. The cost of capital should be weighted by the proportion of debt and equity. As the interest payment are tax deductible, when calculating the weighted average cost of capital, the tax shield benefit of interest expense should be taken into consideration. The formula for weighted average cost of capital is as follows:

$$WACC = R_e \cdot \frac{E}{A} + R_d \cdot \frac{D}{A} \cdot (1 - tr) \tag{3.1}$$

where $WACC$ is weighted average cost of capital, E is equity, D is debt, R_e is the cost of equity, R_d is the cost of debt, tr is the tax rate.

Cost of equity represents the compensation the market demands in exchange for owning the asset and bearing the risk of ownership. It refers to the price paid by a company to obtain funds through the issuance of stock. It is the required rate of return for shareholders. In the terms of measuring of cost of equity, the c widely used methods are capital assets pricing model, arbitrage pricing model, dividend growth model and build-up model.

The capital asset pricing model (CAPM) is a market based approach, which is derived from the capital markets. According to CAPM, the opportunity cost of equity equals to the

expected risk free rate on default free securities plus asset's beta multiplied by the market risk premium or equity risk premium. The formula is:

$$E(R_e) = R_f + \beta_i[E(R_m) - R_f] \tag{3.2}$$

where $E(R_e)$ is the expected return of equity, R_f is the risk free rate, β_i is the sensitivity of the equity's return to the market risk. $E(R_m)$ is the expected return of the market portfolio.

The risk free rate is the expected return on default free securities. Government bonds can be seen as risk free assets. So the risk free rate can be estimated by using the yield of government bonds. The beta coefficient indicates the sensitivity of a company's stock return to the market return. It is the correlation between a company's stock return and the market return. If a security's beta is higher than one, the security is considered riskier with systematic risks higher than the market.

The equity risk premium is adjusted by beta for the expected future return of the individual security and that of the market as a whole. It represents the overall risk of a company as it relates to investing in a large market, such as Standard & Poor's 500 or the New York Stock Exchange. The estimation of beta coefficient can be performed by regression methods. It is the slop of a linear regression between return of specified security and return of market portfolio. For the unknown market portfolio, is typically use broad market indices instead.

The market risk premium is the difference between the equity portfolio and risk free rate. Stocks are riskier than government bonds, the excess return compensates investors for taking on the relatively higher risk of equity investing.

3.2 Monte Carlo Simulation

The Monte Carlo simulation method, in other words a stochastic simulation, can be used to simulate the development of economic added value. This simulation is based on an efficient numerical procedure using repeated random processes. The basis for this method is probability theory and mathematical statistics.

The Monte Carlo method is suitable for solving various tasks. F. Fabian and Z. Kluiber (1998) state that the Monte Carlo method was initially applied to solve complex physical problems. Later, complex technical and economic tasks were solved using this method. Furthermore, problems related to the activities of telephone exchanges, traffic management, collective service, inventory control, etc. The method is also suitable for solving problems in independent mathematics. The Monte Carlo method can be used where the solution of the problem depends on probabilities and for these problems it is difficult or impossible to build an explicit solution algorithm.

Monte Carlo simulations are used to model the probability of different outcomes in a process. For a problem with randomness, it is mainly to correctly describe and simulate this probabilistic process.

When predicting revenues, we can incorporate uncertainty into our forecasts by using Monte Carlo simulation. Constructing a Monte Carlo simulation involves two basic steps. First, generating random numbers. The sample average of an infinite sequence of uncorrelated random variables with the same expected value and variance in all probability converges almost surely to its expected value. The second step is transforming random variables to capture the statistical characteristics of model's input variables.

3.3 Stochastic Process

Generally, stochastic processes include the Wiener process, the Brownian process, Itô process and Itô lemma.

3.3.1 Wiener process

The Wiener process is a real valued continuous-time stochastic process named in honor of American mathematician Norbert Wiener (1894-1964) for his investigations on the mathematical properties of the one-dimensional Brownian motion. Wiener process is also called standard Brownian motion, which was observed by Robert Brown.

The Wiener process is based on two assumptions. It follows the Markov process, which means that the predicted prices are affected only by the current price and not by historical prices, and the second is the price changes are independent over time.

The Wiener process can be defined as:

$$\tilde{z}_T - z_0 = \mathrm{d}z = \tilde{z} \cdot \sqrt{d_t} \tag{3.3}$$

where $\tilde{z}$ is a random number from standard distribution with mean of 0, standard deviation of 1, d_t is infinitely small change of time.

If considering a random variable evolution in several time movement, it expressed as:

$$\tilde{z}_T - z_0 = \Sigma_{\mathrm{i}=1}^{\mathrm{n}} \tilde{z}_i \cdot \sqrt{d_t} \tag{3.4}$$

for $\tilde{z}$ is standard distributed, we can know $E(\tilde{z}_T) = 0$, $\mathrm{Var}(\tilde{z}_T) = n \cdot d_t$, $\sigma(\tilde{z}_T) = \sqrt{\mathrm{T}}$.

3.3.2 Brownian motion

Wiener process describe the random walk of the variable $\tilde{z}$. However, the motion process of most variables in real life includes not only random fluctuations, but also temporal trends and other characteristics, and the variance of random fluctuations does not necessarily equal the length of time. Therefore, the Brownian motion is further introduced on the basis of the Wiener process to better describe the motion characteristics of random variables.

Arithmetic Brownian motion is a special case of Itô lemma, which is sometimes referred to as the so-called generalized Wiener process. We assume a is the drift rate, b^2 is variance rate, the Brownian motion of variable x is:

$$dx = adt + bdz \tag{3.5}$$

where a and b are constant, dz follows the Wiener process. The variable x following the Brownian motion is a dynamic process with respect to time and dz. adt is the determinant, which means the drift of x is a per unit time. bdz is a random term, which represents the noise added to the temporal trend of x.

3.3.3 Geometric Brownian motion

The geometric Brownian motion can be defined as:

$$dx = \mu x dt + \sigma x dz \tag{3.6}$$

It is an Itô process with the drift of $\mu S = a(x;t)$, standard deviation of $\sigma S = b(x,t)$. It can be reformulated in:

$$\frac{dx}{x} = \mu \cdot dt + \sigma \cdot dz \tag{3.7}$$

This process is suitable for expressing the return on the price of asset x. The parameter indicates the average yield over a period of one year and the standard deviation per year.

In order to simulate the path of $S(t)$, we based on the equation:

$$S_t = S_t \cdot exp\left(\mu - \frac{\sigma^2}{2}\right) \Delta\, t + \sigma \cdot \sqrt{\Delta\, t} \cdot dz \tag{3.8}$$

3.3.4 Itô process and Itô lemma

Brownian motion assumes that the drift rate and variance are constant. If the drift rate and variance rate of the variable x are both a function of variable x and time t, then the variable obeys the Itô process:

$$dx = a(x;t)dt + b(x;t)dz \tag{3.9}$$

dz follows the Wiener process, a and b are function of x and t, drift of x is a, standard deviation of x is b.

Itô lemma functions, where the variables are stochastic processes, is similar to Taylor's development formular, which is defined for non-stochastic functions. Itô lemma is defined as:

$$dG = \left[\left(\frac{\partial G}{\partial x} \cdot a(\cdot)\right) + \frac{\partial G}{\partial T} + \frac{1}{2} \cdot \frac{\partial^2 G}{\partial x^2} \cdot b^2(\cdot)\right] \cdot dt + \frac{\partial G}{\partial x} \cdot b(\cdot) \cdot dz \tag{3.10}$$

dz follows the Wiener process, $\left(\frac{\partial G}{\partial x} \cdot a(\cdot)\right) + \frac{\partial G}{\partial T} + \frac{1}{2} \cdot \frac{\partial^2 G}{\partial x^2} \cdot b^2(\cdot)$ and $\frac{\partial G}{\partial x} \cdot b(\cdot)$ are the function of x and t, so function G follows the Itô process, $\left(\frac{\partial G}{\partial x} \cdot a(\cdot)\right) + \frac{\partial G}{\partial T} + \frac{1}{2} \cdot \frac{\partial^2 G}{\partial x^2} \cdot b^2(\cdot)$ is the drift, $\frac{\partial G}{\partial x} \cdot b(\cdot)$ is the variance.

3.4 Seasonal Index

The seasonal index characterizes the typical seasonal characteristics of a sequence in quarters of a year, which is a measure of seasonal variation expressed as a relative number. If there is no seasonal change in the development of the sequence, the seasonal index of each

period should be equal to 1, which means the seasonality has no impact on quarterly revenue. If there is a significant change in each quarter in a certain year, the seasonal index of each period should be not equal to 1.

Seasonal indices can be used to reduce the seasonal effect, and to get a smooth time plot data. When the time series has both seasonal changes and trends, the trend model is first established, and the seasonal index is obtained on this basis.

Taking quarters as an example, the first step is to calculate the average r_i of the observations in the same season in all years:

$$r_1 = \frac{1}{n}(x_1 + x_5 + \cdots + x_{4n-3}) \tag{3.11}$$

$$r_2 = \frac{1}{n}(x_2 + x_6 + \cdots + x_{4n-2}) \tag{3.12}$$

$$r_3 = \frac{1}{n}(x_3 + x_7 + \cdots + x_{4n-1}) \tag{3.13}$$

$$r_4 = \frac{1}{n}(x_4 + x_8 + \cdots + x_{4n}) \tag{3.14}$$

where r_1, r_2, r_3, r_4 are the average of the first, second, third, fourth quarter. n is the number of years. x are the observations.

Second, we separate the trend feature of the data by establishing a trend prediction model to obtain trend values $\hat{x}_t$. We can directly use the original data and time series to establish a linear regression model:

$$\hat{x}_t = a + b \cdot t \tag{3.15}$$

where t is the number of sequence, a is the intercept, b is the slop.

The third step is calculating the average R_i of the same season of the trend values $\hat{x}_t$, the calculation is the same as the first step.

Then, calculating the seasonal index k_i by the ratio of the average of the same season r_i and the average of the trend in the same season R_i:

$$k_i = \frac{r_i}{R_i} \quad (i = 1,2,3,4) \tag{3.16}$$

Seasonal index is a relative number taken the 1 as benchmark. The sum of the seasonal indexes of each quarter in one year should be 4. So the final step is to adjust the seasonal indexes to make the sum equal to four:

$$K_i = \frac{4}{\sum k_i} \cdot k_i \quad (i = 1,2,3,4) \tag{3.17}$$

where K_i is the seasonal index after the adjustment.

3.5 Financial Statement

Financial plan is the future financial statement. It uses currently known variables to predict the items in future. In order to predict the future economic value added, we need to make a financial plan of the items that influence the EVA. Based on formula (2.4), plan of revenue, plan of net income and plan of equity need to be prepared.

3.5.1 Plan of revenue

A sales plan is a strategy that sets out sales targets and tactics for the business. Sales prediction have a significant impact on the quality of financial prediction. If the forecasted sales volume is too low, the company will not be able to meet customer demand without preparing sufficient funds to purchase equipment and reserve inventory. This will not only lose opportunities to create revenue, but also lose its original market share. On the contrary, if the sales forecast is too high, raising a large amount of funds to purchase equipment and stocking inventory, it will result in equipment idle and inventory backlog, which will lead to a decline in asset turnover rate, resulting in a lower return on equity and a fall in stock prices.

Sales forecast is the basis of financial forecasting. Sales plan can be created by using simple time series analysis, predict the future sales based on historical data.

3.5.2 Plan of net income

Percentage of sales method is a common method can be applied in financial forecasting. It assumes that there is a stable relationship between the cost, expenses, liabilities and revenues of the company. According to the predicted revenue, it is possible to predict the income statement and balance sheet of the forecast period. When using the income percentage method, we must first analyze which items have a relatively stable relationship with the

revenue. Items whose amounts change with the change of the revenue are sensitive items such as cost of goods sold, operating expense, non- operating expense and tax expense. Some items like non-operating income and cost, tangible assets are not sensitive to revenues.

For the plan of net income, we can choose to use percentage of sales method to calculate the ratio of cost and expense to the revenues in past years, and then get a weighted average of these ratios.

3.5.3 Plan of equity

A company's equity contains the items of share capital, capital reserve, surplus reserve and retained earnings.

For the prediction of share capital, we can assume that it will grow at a rate of nearly years. Capital reserve refers to the accumulation of funds formed by the company in the course of business due to acceptance of donations, equity premiums and revaluation of assets. Other comprehensive income contains the items like gains or losses from foreign currency translation and from changes in fair value of available-for-sale financial assets. Surplus reserve refers to accumulated funds that the company extracts from the net income according to regulations. The France law stipulates that the statutory earned reserve is drawn at 10% of the company's after-tax income. When the accumulated surplus reserve has reached more than 50% of the registered capital, it can no longer be withdrawn. The surplus reserve is used to make up for losses and transfer to paid-in capital. For these items, they are not so predictable, and connect with uncontrollable factors. We can assume them as the geomatics average of nearly years.

Retained earnings are an important concept in accounting. The term refers to the historical income earned by a company, minus any dividends it paid in the past. The word "retained" captures the fact that because those earnings were not paid out to shareholders as dividends they were instead retained by the company. For this reason, retained earnings decrease when a company either loses money or pays dividends, and increase when new income are created.

3.6 Exponential Weighted Moving Average (EWMA)

The Exponentially Weighted Moving Average (EWMA) is a statistic for monitoring the process that averages the data in a way that gives less and less weight to data as they are further removed in time.

For the Shewhart chart control technique, the decision regarding the state of control of the process at any time, t, depends solely on the most recent measurement from the process and, of course, the degree of "trueness" of the estimates of the control limits from historical data. For the EWMA control technique, the decision depends on the EWMA statistic, which is an exponentially weighted average of all prior data, including the most recent measurement.

By the choice of weighting factor, λ, the EWMA control procedure can be made sensitive to a small or gradual drift in the process, whereas the Shewhart control procedure can only react when the last data point is outside a control limit. It is expressed as:

$$\hat{y}_t = (1-\lambda)y_{t-1} + \lambda \cdot \hat{y}_{t-1} \tag{3.18}$$

where λ is decay factor. It is between zero and one.

The decay factor can be estimated by minimizing the criterion of the root mean square error (RMSE). It is a commonly used measure of the difference between measured values and the observed values. RMSE is the square root of the ratio of square of the difference between the observed values and the true values to the number of observations:

$$RMSE = \sqrt{\frac{\sum_{t=1}^{n}(\hat{y}_t - y_t)^2}{n}} \tag{3.19}$$

where $\hat{y}_t$ is the estimated value, y_t is the true value, n is the number of observations.

3.7 Value at Risk

Value at risk (VaR) is a measure of the risk of loss for investments. It estimates how much a set of investments might lose (with a given probability), given normal market conditions, in a set time period such as a day. VaR is typically used by firms and regulators in the financial industry to gauge the amount of assets needed to cover possible losses.

Value at risk is the minimum predicted loss at a certain probability over a period of time. That is, the profit $\Delta\tilde{\pi}$ is less than a predetermined level $+VaR$ is equal to the probability a:

$$Pr = (\Delta\tilde{\pi} \leq +VaR) = a \tag{3.20}$$

In instead of the profit as a loss, the loss $\Delta\tilde{\pi}$ is more than a predetermined level $-VaR$ is equal to the probability a:

$$Pr = (\Delta\tilde{\pi} \leq -VaR) = a \tag{3.21}$$

3.8 Quantified Properties

In order to quantitatively describe features of a collection of data, the mean, median, mode, variance, standard deviation, the minimum and maximum values of the variables are usually used.

The Weighted arithmetic mean $\bar{x}_w$, based on the arithmetic mean, is obtained by multiplying each value by the corresponding weight, the sum of all the data in a set of data divided by the number of sets of data. The size of the weighted average depends not only on the size of the observed values, but also on the frequency of each value. It can be expressed as:

$$\bar{x}_w = \frac{\Sigma_{i=1}^{N} w_i x_i}{\Sigma_{i=1}^{N} w_i} \tag{3.22}$$

Where N the total number of observations, x_i is the observed values, w_i represent the weights.

Variance σ^2 is a measure of the degree of dispersion of a set of data. It is the average of the sum of the squares of the deviations of the individual data from their arithmetic mean. It can be expressed as:

$$\sigma^2 = \frac{1}{N} \cdot \Sigma_{i=1}^{N} (x_i - \bar{x})^2 \tag{3.23}$$

The return R_t over s single period can be calculated as:

$$R_t = \frac{x_t - x_{t-1}}{x_{t-1}} \tag{3.24}$$

The logarithmic returns R_t^{log} or continuous return can be expressed as:

$$R_t^{log} = ln \frac{x_t}{x_{t-1}} \tag{3.25}$$

4. Forecasting of Selected Indicators in a Given Company

4.1 Company characteristics

Ubisoft Entertainment SA, founded in 1986, is a multinational game production, distribution and sales agency. As a leader in the entertainment industry, its extensive business has steadily expanded. On the basis of cooperating with established game companies, it is also constantly launching unique products to strengthen its influence in the international market. In 2008, it was the third largest independent game developer in Europe and the fourth independent publisher in North America.

Its video game franchises include *Prince of Persia, Rayman, Assassin's Creed, Tom Clancy's, Far Cry, Rabbids, Just Dance, For Honor, Watch Dogs and Anno*.

4.1.1 History of the given company

Formally established of Ubisoft Entertainment SA was founded in France by the five Guillemot brothers in 1986. It is engaged in the publishing and distribution of educational software and game software. The company grew rapidly with the success of a series of brands such as Amstrad, Atari, Amiga on personal computers and the cooperation with Elite, Electronic Arts, Sierra and other leading European game publishing companies at that time.

Between 1989 and 1990, Ubisoft opened its first overseas branch. With a very accurate view of the market and entered the three major Western game markets in one fell swoop: the United States, the United Kingdom and Germany, and quickly gained a foothold.

In 1990, the five brothers were determined to create their own games, so they began to hire a large number of young technicians. They soon discovered that the family workshop-style production model was about to be eliminated, so in 1994, Ubisoft established its own game studio in Montreuil, France. The game *"Rayman"* successfully developed and has become one of the most famous games today. In 1995, *"Rayman"* was released.

In 1996, Ubisoft's stock went public, and at the same time, it divided new production bases in Shanghai, China and Montreal, Canada. Ubisoft's product quality and service make

it highly praised by users. Warner and Disney have also collaborated with Ubisoft to develop games.

In 2000, Ubisoft acquired two major North American game production companies: Red Storm Entertainment and TLC GAME Studios. At the same time, in order to enter the PC game market, it also acquired an established developer of strategy games and online games: Blue Byte Software.

From 2002 to 2004, it became a successful brand with many best-selling brands and awards, especially *Tom Clancy's Splinter Cell, Prince of Persia the Sands of Time, Far Cry, Beyond Good and Evil, Tom Clancy's Rainbow Six 3*. Established distribution departments in South Korea, Finland, Canada, and Switzerland, and acquired Tiwak production studio in France. Announced the new LOGO, announcing that the game sales exceeded 100 million copies.

Entering Hollywood from 2004 to 2005, Ubisoft signed a series of licensing agreements with some major Hollywood companies: reached an agreement with Universal Studios Consumer Products Group, based on the development of the three-Oscar-winning director Peter Jackson's remake of *"King Kong"* The game of the same name. Signed a contract with Sony to develop the first game based on Sony Pictures Animation's computer animation special effects. Signed a license agreement with LucasArts to produce the handheld game *"Star Wars Prequel 3: Revenge of the Sith"*.

From 2005 to 2006, the 20th anniversary of Ubisoft's establishment, the 20th anniversary celebration of entering the next generation of Ubisoft ushered in a new era in 2006. Complete the pre-positioning of the next-generation handheld. With *Tom Clancy's Ghost Recon* and other works, established the leading position of video games and entertainment systems based on Microsoft's Xbox 360 platform.

Ubisoft established another IP, *Assassin's Creed*, first launched in 2007; *Assassin's Creed* was originally developed by Ubisoft Montreal as a sequel to *Prince of Persia: The Sands of Time* and instead transitioned to a story about Assassins and the Templar Knights.

Within 2008, Ubisoft made a deal with Tom Clancy for perpetual use of his name and intellectual property for video games and other auxiliary media.

Ubisoft announced plans in 2013 to invest $373 million into its Quebec operations over 7 years. The publisher is investing in the expansion of its motion capture technologies and consolidating its online games operations and infrastructure in Montreal. By 2020, the company would employ more than 3,500 staff at its studios in Montreal and Quebec City.

Since 2008, Ubisoft became a leader in the entertainment industry. In 2007, Ubisoft became the third-ranked independent game distributor in the world (except Asia). Established new studios in Bulgaria, China, Singapore, India and Ukraine; established new distribution branches in Mexico and Poland. Successfully acquired Reflections Interactive (UK), Massive Entertainment (Sweden), and some development studios in Japan. In November 2007, the hit Assassin's Creed was released, and the game became the best-selling video game brand in the history of the United States and the United Kingdom. Successfully acquired the related copyrights of Far Cry and Anno games, and later obtained all the intellectual property rights and related products related to the Tom Clancy series of video games in one fell swoop. Ubisoft's game titles with sales of over one million have grown from 10 to 14 games.

4.1.2 Calculation of EVA

Economic value added of equity (the following is abbreviated as EVA) measures a company's performance based on equity return. It is the value created by a company for its shareholders after satisfying the opportunity cost of equity capital employed by the company.

For the calculation of EVA, we need to calculate the cost of equity of the company. That is the opportunity cost of investor's capital. Based on capital asset pricing model, we need the data for risk free rate, beta coefficient of Ubisoft Entertainment SA Company, and stock market risk premium to obtain cost of equity. The risk free rate is the expected return on default free securities. We take the average yield of one year government bond as risk free rate. Using the equation (2.10), we can get the table 4.1 shows the data from 2012 to 2021.

Table 4.1 Cost of equity based on CAPM from 2012 to 2021

	Risk free rate	Market risk premium	Beta coefficient	Cost of equity
2021	-0.55%	6.13%	0.84	5.06%
2020	-0.47%	6.82%	1.08	7.40%
2019	0.10%	7.49%	1.03	7.71%
2018	0.64%	5.61%	0.86	4.91%
2017	0.44%	6.23%	1.28	7.85%
2016	0.27%	6.98%	1.05	7.32%
2015	0.27%	6.37%	1.29	8.14%
2014	1.57%	6.22%	1.31	7.66%
2013	1.62%	7.01%	1.17	7.93%
2012	1.83%	8.26%	1.29	10.12%

Source: http://www.market-risk-premia.com/fr.html

https://fred.stlouisfed.org/series/DGS20

We can see form the development cost of equity from the table. From 2012 to 2021, it was gradually decreasing but very unstable, and in year 2015 it reaches another highest 8.14% after 2021, the highest cost of equity of 10.12%. The decline of cost of equity mainly caused by a decline of equity risk premium. Ubisoft equity cost was not so high, and the beta coefficient is not so low, which is around 0.8 to 1.3, the average beta coefficient is 1.12 in these ten years. In general, the risk of Ubisoft security is higher than the market, investors expected higher return on the stocks.

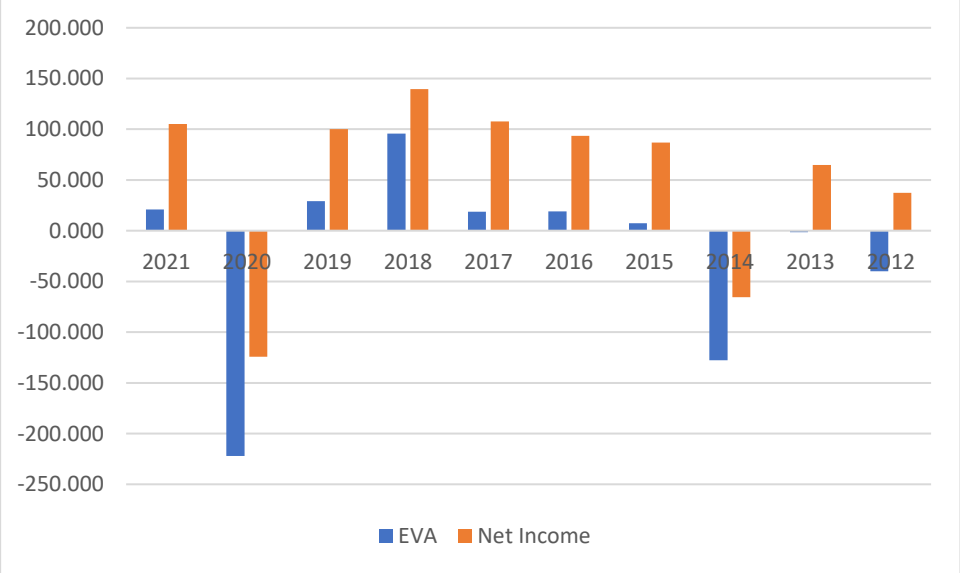
Return on equity is another indicator need to be prepared for the calculation of economic value added of equity. Investors want to achieve largest difference between the return on equity and cost of equity. The return investors can obtain should be higher than the minimum requirement. The calculation of EVA based on equation (2.4) is shown in following table.

Table 4.2 Calculation of EVA (in million euro) from 2012 to 2021

	ROE	Equity	EVA
2021	6.32%	1665	20.931
2020	-9.40%	1321.7	-222.048
2019	10.87%	920.018	29.036
2018	15.68%	889.33	95.749
2017	9.51%	1133.816	18.795
2016	9.17%	1018.51	18.899
2015	8.88%	979.382	7.299
2014	-8.09%	810.048	-127.587
2013	7.73%	838.227	-1.609
2012	4.89%	762.707	-39.901

From the table, we know that the ROE of the company is not stable in the ten years, fluctuating from -10% to 15%. Because of the high fluctuation of ROE, there was a great fluctuation between return on equity, and the economic value added was also not stable. The following figure shows a comparison of EVA and net income.

Figure 4.3 Comparing of EVA and net income (in million euro)



We can see that Ubisoft EVA and net income have the same moving trend, in 2020 and 2014 there is a big fall of net income and EVA, and except these two years, the net income shows a gradually increasing trend. The figure shows that the EVA is significantly lower than net income because of the deduction of the cost of equity in calculating EVA. From the perspective of EVA, the value of EVA should be always greater than 0, otherwise the company cannot be continuing to create value for shareholders every year. In the figure, there are two big decreasing in 2020 and 2014, and the net income and EVA both lower than 0. However,

we can mainly ascribe the fall to the big crisis in the two years, Russia financial crisis in 2014 and COVID-19 in 2020.

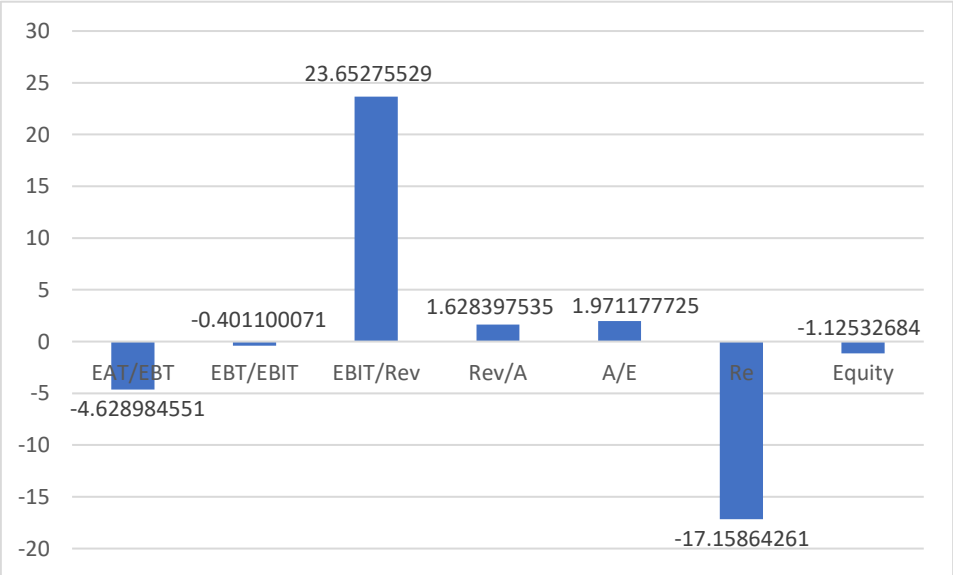
4.1.3 Pyramidal Decomposition and Influence Quantification of EVA

In chapter 2.5, there is a description about the structure of pyramidal decomposition of EVA. The absolute change of the component items showed in table 4.4. Logarithmic method is applied in influence quantification. We give an example of the quantified influences of these items from 2012-2013 in following figures 4.5, and the number in bracket is the rank of the influence. In the figure 4.6, there is a summary of influence of all the years.

Table 4.4 Absolute change of component items from 2012-2021

	EAT/EBT	EBT/EBIT	EBIT/Rev	Rev/A	A/E	Re	Equity	EVA
2020-2021	-113.98%	-49.76%	16.74%	1.28%	20.64%	-2.32%	343.30	242.68
2019-2020	90.84%	38.59%	-12.35%	-11.88%	-84.73%	0.15%	401.68	-255.17
2018-2019	0.55%	-0.53%	-4.22%	-5.62%	42.05%	2.32%	30.69	-62.33
2017-2018	-0.87%	3.28%	0.79%	5.20%	87.69%	-2.94%	-244.49	76.95
2016-2017	-8.21%	0.63%	2.23%	-12.44%	29.32%	0.54%	115.31	-0.10
2015-2016	13.80%	-10.55%	0.29%	-14.55%	19.48%	-0.82%	39.13	11.60
2014-2015	-12.69%	11.06%	19.25%	8.34%	13.59%	0.26%	169.33	136.64
2013-2014	4.26%	-15.11%	-16.72%	-24.71%	15.33%	-0.05%	-28.18	-127.74
2012-2013	-7.06%	-0.87%	2.70%	3.30%	5.97%	-2.19%	75.52	38.26

Figure 4.5 Influence of component items of EVA – equity from 2012 to 2013



Economic value added increased 38.256 million euro in 2013 compared to 2012. There are three items had positive impact on the change of EVA, which are the ratio of asset to equity,

the ratio of revenue to asset and the ratio of EBIT to revenue, for which the 5.97% increase of A/E contributed to the 1.971 million euro increase of EVA, the 3.30% increase of Rev/A contributed to the 1.628 million euro increase of EVA, the 2.70% increase of EBIT/Rev contributed to the 23.653 million euro increase of EVA.

There are four items had negative impact on the change of EVA, which are the equity, the return on equity, the ratio of EBT to EBIT and the ratio of EAT to EBT, for which the 75.52 million euro increase of equity contributed to the 1.125 million euro decrease of EVA, the 2.19% decrease of return on equity contributed to the 17.159 million euro decrease of EVA, the 0.87% decrease of interest burden (EBT/EBIT) contributed to the 0.401 million euro increase of EVA, the 7.06% decrease of tax burden (EAT/EBT) contributed to the 4.629 million euro increase of EVA.

During the year 2012 to 2013, the revenues increased 18.36%, from 1061.296 million euro to 1256.164 million euro, and the cost of goods sold decreased 0.15%, which means the increase of the revenues is not only due to the lower cost and the good selling of major products. Not only that, the long term and short term debt was increasing in this year, with a higher financial leverage level could promote the increasing of return on equity and economic value added. The turnover period of short term assets decreased from 116.4 days to 98.2 days, with the cash on hand increased 35.29%, which was a good signal for the increasing of economic value added.

Figure 4.6 Influence of component items of EVA summary from 2012 to 2021

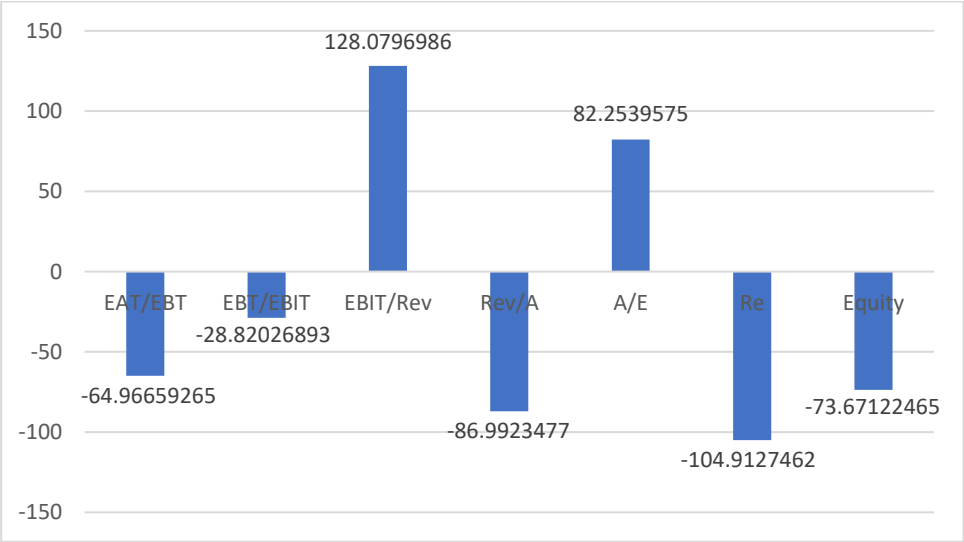


Figure 4.6 shows the summary of the influence of these items for the ten years. During these ten years, Ubisoft didn't gain large increase of economic value added, with 60.796 million euro.

We can find that the positive impact to the change of economic value added are the ratio of EBIT to revenue and the rate of asset to equity. On the other word, the company was benefit from the cost and expenses control of the goods selling and the financial structure control.

However, the other items all had the negative influence on economic value added, especially the return on equity and the assets turnover ratio. With the strong influence of the competition on entertainment market, Ubisoft didn't have a good and stable financial return of the shareholders, and the efficiency of a company's assets in generating revenue was also a problem. The tax burden and interest burden also have negative influence. As the borrowing and cost borrowing increasing gradually, rely on increasing financial leverage is not a good choice to increase economic value added. Meanwhile, even the interest cost is the tax deductible item, the increasing effective tax rate is also a problem for Ubisoft.

4.2 Financial Performance Prediction based on EVA

In this section, we focused on the economic value added prediction of Ubisoft Entertainment SA which will be made from year 2021 to 2022. We predict the company's sales based on Monte Carlo simulation firstly, and create a financial plan based on sales. We estimate the cost of equity for 2021, then prediction the EVA based on this information. Finally, there is a sensitivity analysis of the EVA.

4.2.1 Prediction of Revenues

Prediction of revenues is the basis of the financial performance prediction. In order to estimate the future revenues, we simulate revenue developments based on the Monte Carlo simulation method by geometric Brown motion. The table 4.4 shows the historical quarterly revenues of Ubisoft Entertainment SA from 2011 to 2020.

Table 4.7 Quarterly revenues (in million euro) from 2011 to 2020

year	Quarter1	Quarter2	Quarter3	Quarter4	sum
2011	103	146	652	161	1062
2012	131	148	802	175	1256
2013	76	217	520	194.1	1007.1
2014	360.1	124.1	809.7	169.9	1463.8
2015	96.6	110.7	561.8	624.9	1394
2016	139.1	142.2	529.9	648.6	1459.8
2017	202.1	264.2	725	540.7	1732
2018	400	367.1	562	516.5	1845.6
2019	363.4	334.1	416.2	481.1	1594.8
2020	427.3	329.7	965.01	501.8	2223.81

There was an increasing trend of the historical revenues. Because the data are quarterly data, it had seasonal movements. In general, sales were highest in the third quarter, followed by the fourth quarter, then the first quarter, and last is the second the fourth quarter. It has a connection with the release of the new video game, usually the video games' trailers will be announced in first half of the year and the game will be started to sell in the second half of the year, so the Ubisoft Entertainment SA revenue is gained mainly in fall.

Before applying Monte Carlo simulation, we need to deseasonalize the data through diving the data by seasonal index. After simulating the revenues for 2021, we need to covert the data back by multiplying by the seasonal indexes.

The calculation of seasonal index follows the steps described in chapter 3.4. First, we calculate the average of the same quarter in the ten years based on formula (3.11) to (3.14). The average for the four quarters are 229.86, 218.31, 654.36, 401.36 million euro.

The data has an increasing trend. So the second step is to use the original data and time series to obtain the trend line based on equation (3.15), the slop and intercept of the linear equation in two unknowns are 7.6049 and 220.07 million euro.

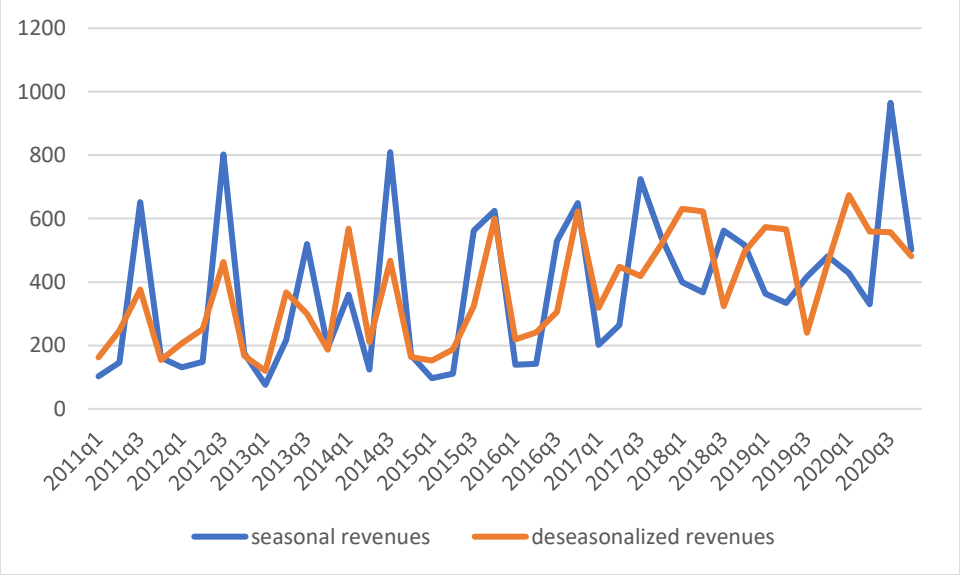
And then calculate the average of trend of each quarter. The average of the trend for each quarter is 364.56, 372.17, 379.77, 387.38 million euro.

Then, calculating the seasonal indexes by the ratio of the average of the original data in same season and the average of the trend in the same season based on formula (3.16). The seasonal indexes for quarter one to four are 0.630508, 0.58659, 1.723032, and 1.036094.

If there is no seasonal change a sequence, the seasonal index of each season should be equal to 1. The sum of the seasonal indexes should be four. We need to adjust the seasonal indexes to make the sum equal to four. The adjusted seasonal indexes based on formula (3.17) are 0.634278, 0.590097, 1.733335 and 1.04229.

Then we divided the original data by the adjusted seasonal index to obtain the revenues after seasonal adjustment. The figure 4.8 shows movements of the seasonal revenues and deseasonalized revenues. In some quarters the original revenues are abnormal, too high or too low against the same quarter in other years, but overall, the deseasonalized revenues line is more smoothly than the seasonal revenues.

Figure 4.8 Seasonal revenues and deseasonalized revenues



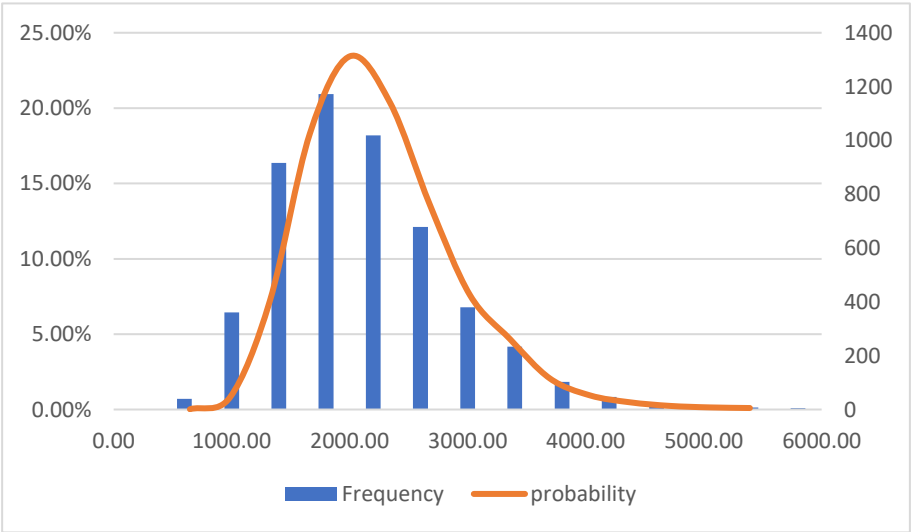
Then, we can apply Monte Carlo simulation, we generated 5000 random numbers from a normal distribution. Then we calculated the logarithmic returns of the revenues by using the deseasonalized revenues, the calculation is based on formula (3.25). Based on the logarithmic returns, we can get the parameters used to determine the revenues for next four periods. In order to simulate S following a Geometric Brownian motion based on formula (3.8). We need to obtain the mean value, which is 0.040602, and standard deviation, which is 0.920371. And the Δt parameter is set to be 0.25 as the data is quarterly. Inserting the mean, standard deviation, Δt and the random numbers into formula (3.8), we can get 5000 groups scenario of sales revenues for the next four periods. Then we covert the deseasonalized data to the data

with seasonality by multiplying the seasonal indexes, for each quarter is 0.630508, 0.58659, 1.723032, and 1.036094. At last, we sum the sales for the four quarters to get the revenue for the years 2021. The following table 4.9 and figure 4.10 shows the frequency and probability distribution of the revenues.

Table 4.9 The frequency, probability distribution and cumulative distribution of the revenues in 2021

	Total revenue	Frequency	Probability	Cumulative probability
MIN	646.55	1	0.02%	0.02%
	985.49	40	0.80%	0.82%
	1324.43	361	7.22%	8.04%
	1663.37	916	18.32%	26.36%
	2002.31	1172	23.44%	49.80%
	2341.25	1019	20.38%	70.18%
	2680.19	679	13.58%	83.76%
	3019.13	380	7.60%	91.36%
	3358.07	234	4.68%	96.04%
	3697.01	103	2.06%	98.10%
	4035.95	47	0.94%	99.04%
	4374.90	24	0.48%	99.52%
	4713.84	12	0.24%	99.76%
	5052.78	7	0.14%	99.90%
MAX	5391.72	5	0.10%	100.00%

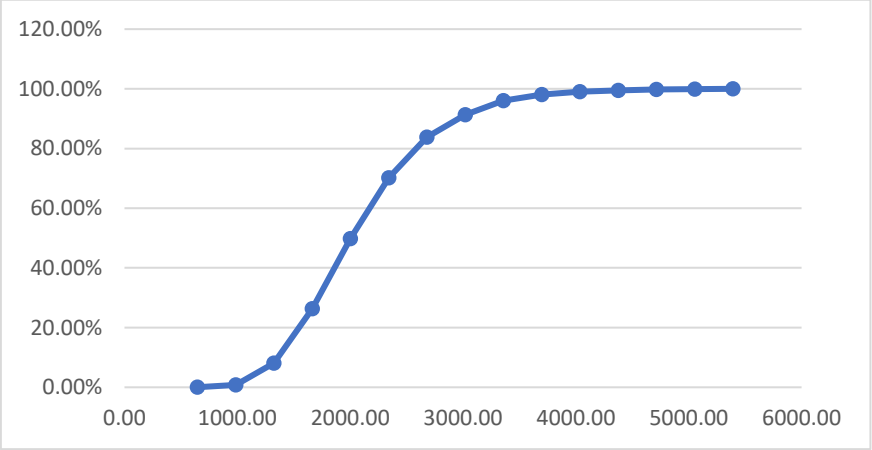
Figure 4.10 The frequency, probability distribution and cumulative distribution of the revenues in 2021



The table 4.9 shows that the minimum revenue of the 5000 scenarios is 646.55 million euro, the maximum revenue is 5391.72 million euro. The equivalent interval of 15 frequencies is 338.94 million euro. And the average revenue for all the 5000 scenarios is 2097.16 million euro. The standard deviation is 634.61 million euro.

In the figure, the curve shows the probability distribution and the column represent the frequency of revenues fall in its corresponding interval. From the frequency column in the table, we can find that the highest probability interval of the revenues will fall into is from 1663.37 to 2002.31, the frequency in total is 1172, and the probability is 23.44%. The second interval the revenues are most likely fall into is from 2002.31 to 2341.25 million euro, the probability is 20.38% and there are 1019 numbers fall in this interval. The third possible interval is from 1324.43 to 1663.37 million euro, the probability is 18.32% and there are 916 numbers fall in this interval.

Figure 4.11 Cumulative distribution of revenues in 2021



In the figure 4.11, the curve shows the cumulative distribution. The revenue in 2020 is 2223.81, which is at the curve around 63%, which means there is 63% probability that the revenue in 2021 will be less than that in 2020. By calculating the value at risk of 1% and 5%, we know that 99% probability of sales will exceed 1016.3 million euro, and 95% probability of sales will exceed 1232.71 million euro.

4.2.2 Prediction of Financial Statement

For the calculation of future economic value added based on equation (2.4). We need to predict the future financial statement, which are prepared for calculation of ROE and the

equity. So we need to make a financial plan for these two items. The methodology was described in chapter 3.3.

In order to predict the net income created in 2021, we need to create a financial plan for the whole income statement for 2022, mainly based on percentage of sale method. The historical income statement is shown in annex 2, which is used as the basis for future prediction. According to the income statement, the item we need to predict are cost of goods sold, operating expense, non-operating expense, financial costs and taxes paid.

Costs and expenses associated with a company's operating activities are sensitive to revenue. In addition to the operating cost most related to the company's business behavior, the company's interest cost is also very important. Except the long-term loans used for long-term operation preparation, it is mainly used to pay short-term loans, and the purpose of short-term loans is to purchase raw materials and inventories for short-term use. We estimate the future costs and expenses based on the ratio of historical costs and expenses to revenue, then eliminate them from future revenue to get net income. First, we will calculate the proportion of cost to income in previous years, and then assign different weights to different years, the closer the year is, the higher the weight, and then calculate the weighted proportion of cost to income. We can use the weighted ratios and the revenue we already forecast to forecast costs and expenses for 2021 to 2022. The process is shown in Table 4.12.

Table 4.12 Prediction of costs and expenses in 2021 (in %)

	COGS/Rev	Operating expenses/Rev	Non-operating expenses/Rev	Financial expenses/Rev	Effective tax rate	Weight
2020-2021	0.146461	0.6737566	0.0496448	0.0232035	0.557611	40%
2019-2020	0.1587033	0.8154628	0.0632054	0.0119764	-0.582166	20%
2018-2019	0.1782542	0.7089235	0.0266759	0.0058937	0.326260	10%
2017-2018	0.1713846	0.6781685	0.0220805	0.0077372	0.331784	10%
2016-2017	0.1855551	0.6768255	0.0171892	0.0111003	0.323080	5%
2015-2016	0.2188419	0.6691621	0.0138695	0.0098465	0.240968	5%
2014-2015	0.23028	0.6596536	0.0148365	-0.000486	0.378959	4%
2013-2014	0.2832501	0.7915346	0.0224683	-0.010262	0.252049	3%
2012-2013	0.2727789	0.6538255	0.0034175	-0.003183	0.294656	2%
2011-2012	0.3233424	0.6336696	0	-0.002324	0.224080	1%
Prediction						
2021-2022	0.1719065	0.7081492	0.0402634	0.0136729	0.231472	

From the table we can see that the main cost is from the operating expenses and cost of goods sold. As an entertainment company, it's normal to use the main cost in day-to-day activities, such as video game development and announcement. The non-operating income and expense and financial expenses have a very small proportion on the total cost. For the non-operating expense, which is mainly come from the activities like non-current assets disposal, liquidated damages and donations. For the financial expenses, it's come from the borrowing, foreign exchange and other financial activities. Both of these two items are not related to the activities of day-to-day main business and don't have significant relationship with revenues.

As for taxes costs, as the main taxes cost is from the corporate tax, and the France tax rate is 26.5%, but other related taxable income is unknown, tax rate is different and the tax law is complicative, so we decide to calculate the weighted effective tax rate to predict the taxes cost, and the prediction way is the same with other cost ratio. The effective tax rate for 2012 to 2021 by using income taxes divided by earnings before taxes, and the weighted effective tax rate is rate we use for the prediction of 2021 to 2022 is 23.1472%.

After all these items are prepared, we can create the income statement for 2021. As the example, we choose the highest frequency of total revenue, in the sales scenario of 2002.31 million euro. The following table 4.13 shows the income statement for 2022.

Table 4.13 Income statement for 2022 in the revenue scenario of 2002.31 million euro

Revenue	2002.31
Cost of goods sold	-344.21
Gross Margin	1658.10
Operating cost and expenses	-1417.93
Current Operating Income	240.17
Other non-operating income or expenses	-80.62
EBIT	159.55
Net Financial Income	-27.38
EBT	132.17
Income taxes	-30.59
Consolidated net income	101.58

Next step is to predict for the company's equity. We can find the component items of equity are share capital, equity premiums, consolidated reserves and consolidated earnings. The method for prediction of these items is based on the description in chapter 3.3.

The share capital is the funds paid into a business by investors in exchange for common or preferred stock. This represents the core funding of a business, to which debt funding may be added. Equity premium refers to the phenomenon that the return on stock is greater than the return on risk-free assets. Consolidated reserves are listed in the balance sheet as company's own shares, as the Group buys its own shares on the market, and translation reserve, includes all foreign exchange gains and losses resulting from the translation of the financial statements of foreign subsidiaries. These three items are related to the company's equity premiums and the company's activities of capital, so they are not predictable. We assume the share capital, equity premium and surplus reserves in 2021 follows the geometric mean of the increasing rate of the past ten years. The predicted capital in 2021 is 9.861 million euro, the predicted equity premium in 2021 is 558.9366 million euro, the predicted consolidated reserves in 2021 is 1141.245 million euro, all of these three items are constant in any scenarios of prediction.

As the Ubisoft company didn't pay the dividends in recent years, so we assume that the retained earnings in 2021 is the same as the revenue in 2021.

The plan of income statement and equity was created for 5000 scenarios. The table 4.14 shows the equity of the company for 2021 in the sales scenario of 2002.31 million euro.

Table 4.13 Equity in 2021 in the sales scenario of 2002.31 million euro

share capital	9.861043
premiums	558.9366
consolidated reserves	1141.245
consolidated earnings	101.58
Total Equity	1811.617

4.2.3 Prediction of Cost of Equity

The calculation of cost of equity is based on CAPM (capital asset pricing model). So, we need to estimate the equity risk premium for the whole market, risk free rate and beta

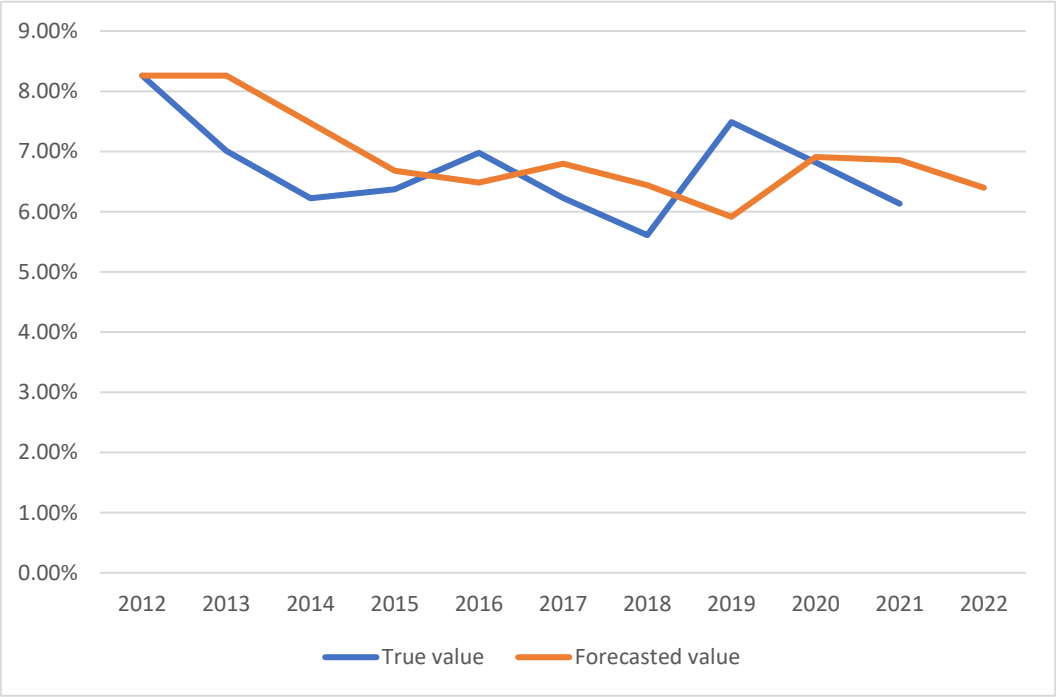
coefficient for the company. The historical of data are collected from the website http://www.market-risk-premia.com/fr.html. The prediction is based on EWMA (exponential weighted moving average) method, which was described in chapter 3.5.

The estimation of future equity risk premium is based on the formula (3.18). The decay factor is determined by minimizing the root mean square error, and the calculation is based on formula (3.19). The historical data and estimate are shown in the following table 4.14, and the development trend is seen in the figure 4.15.

Table 4.14 Equity risk premium forecasted by EWMA

year	True value	Forecasted value	Estimated error
2012	8.26%	8.26%	0.00000
2013	7.01%	8.26%	-0.01250
2014	6.22%	7.47%	-0.01250
2015	6.37%	6.68%	-0.00310
2016	6.98%	6.48%	0.00496
2017	6.23%	6.80%	-0.00568
2018	5.61%	6.44%	-0.00829
2019	7.49%	5.91%	0.01575
2020	6.82%	6.91%	-0.00091
2021	6.13%	6.85%	-0.00723
2022		6.40%	

Figure 4.15 Equity risk premium forecasted by EWMA



The decay factor is 0.36784038 and the root mean square error is 0.00912137. The forecasted equity risk premium for 2022 is 6.40%.

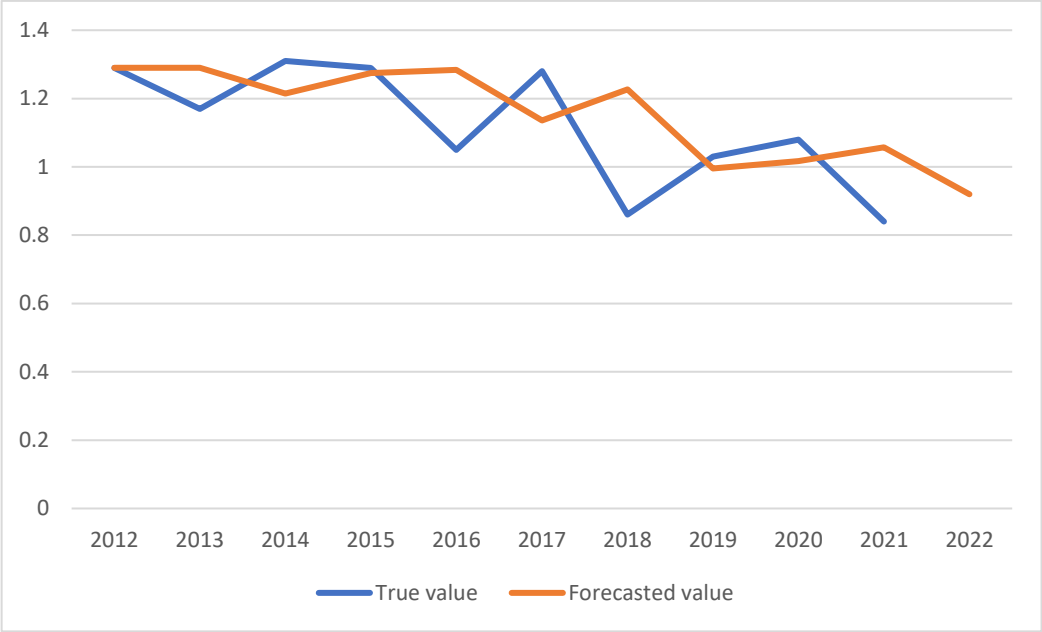
The beta coefficient is the sensitivity of an individual stock's returns to the returns of a market portfolio. If beta coefficient equals to 1, it indicates that the risk return rate of the individual asset changes in the same proportion as the average risk return rate of the market portfolio. If beta coefficient higher than 1, indicating that the risk return of the individual asset is higher than the average risk returns of the market portfolio, which means the risk degree of the individual asset is higher than the risk of the entire market portfolio. If beta coefficient lower than 1, indicating that the risk return of the individual asset is less than the average risk returns of the market portfolio, which means the risk degree of the individual asset is less than the risk of the entire market portfolio.

For the estimation the future beta coefficient, we use the same decay factor used in the prediction of equity risk premium for the prediction of risk premium. The historical data and estimate are shown in the following table 4.18, and the development trend is seen in the figure 4.19.

Table 4.18 Beta coefficient forecasted by EWMA

year	True value	Forecasted value	Estimated error
2012	1.29	1.29	0.00000
2013	1.17	1.29	-0.12000
2014	1.31	1.21	0.09586
2015	1.29	1.27	0.01526
2016	1.05	1.28	-0.23439
2017	1.28	1.14	0.14378
2018	0.86	1.23	-0.36711
2019	1.03	1.00	0.03496
2020	1.08	1.02	0.06286
2021	0.84	1.06	-0.21688
2022		0.92	

Figure 4.19 Beta coefficient forecasted by EWMA



The decay factor is 0.36784038 and the root mean square error is 0.178391649. The forecasted Beta coefficient rate for 2022 is 0.92, which means that the risk return of the Ubisoft's asset is lower than the average risk returns of the market portfolio, and the risk degree of the Ubisoft's asset is lower than the risk of the entire market portfolio.

For the estimation the future risk free rate, as we use the French one-year government bond yield as the risk-free rate, which is not changing overtime and relatively fixed compared with other two factors, so we can directly use the government bond yield rate in the closest announced time as the future risk free rate, which is -0.472%.

So, according to CAPM and the prediction above, the cost of equity of the company in 2021 is 5.85% based on formula (3.2), which is lower than the average degree of past ten years, which is 7.41%.

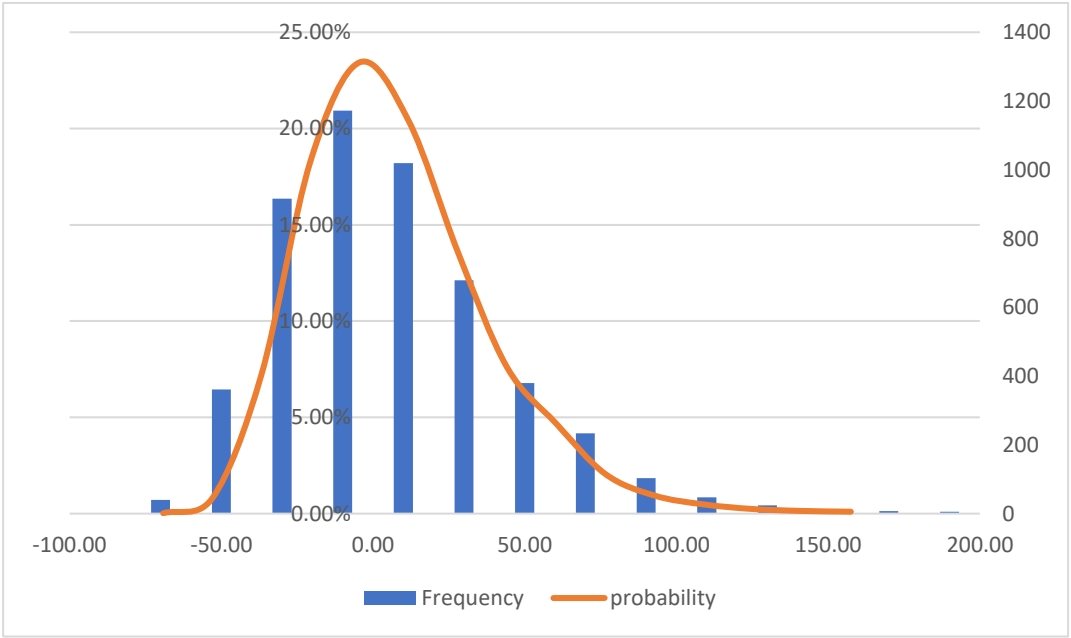
4.2.4 Prediction of Economic Value Added

Based on the analysis results in chapter 4.2.2, 4.2.3 and the equation (2.4), we can calculate the company's economic value added of equity in 2021. The table 4.20 and figure 4.21 shows the 5000 scenarios frequency, probability and cumulative distribution of EVA made in year 2021.

Table 4.20 The frequency, probability distribution and cumulative distribution of EVA in 2021 (in million euro)

	Total revenue	Frequency	Probability	Cumulative probability
MIN	-69.07	1	0.02%	0.02%
	-52.88	40	0.80%	0.82%
	-36.69	361	7.22%	8.04%
	-20.50	916	18.32%	26.36%
	-4.32	1172	23.44%	49.80%
	11.87	1019	20.38%	70.18%
	28.06	679	13.58%	83.76%
	44.25	380	7.60%	91.36%
	60.44	234	4.68%	96.04%
	76.63	103	2.06%	98.10%
	92.82	47	0.94%	99.04%
	109.01	24	0.48%	99.52%
	125.20	12	0.24%	99.76%
	141.39	7	0.14%	99.90%
MAX	157.58	5	0.10%	100.00%

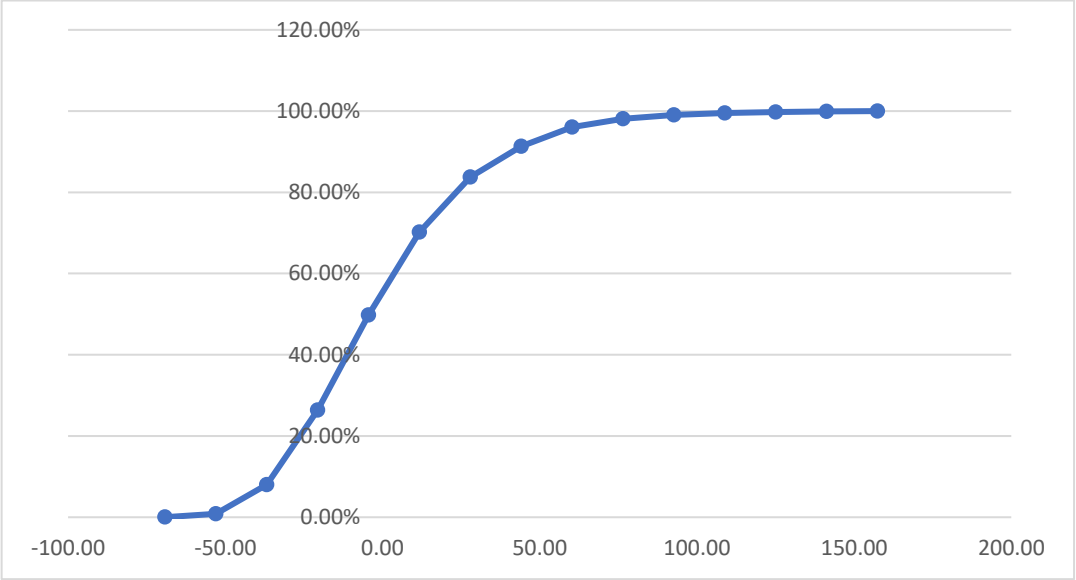
Figure 4.21 The frequency, probability distribution and cumulative distribution of EVA in 2021 (in million euro)



The equivalent interval of table 4.20 is 16.19 million euro. From the frequency column in the table, we can find that the economic value added has the biggest probability falling in

the interval from -20.50 to -4.32 million euro. The frequency of 5000 scenarios fall into this interval is 1172. And the probability for the EVA falling in the interval is 23.44%. The second interval the revenues are likely fall into is from -4.32 to 11.87 million euro, there are 1019 scenarios fall in this interval and the probability is 20.38%. The third interval the revenues are likely fall into is from to -36.69 to -20.50 million euro, there are 916 scenarios fall in this interval and the probability is 18.32%.

Figure 4.22 Cumulative distribution of EVA in 2021 (in million euro)



The figure shows the cumulative distribution. We calculate the EVA made in year 2020 and it's 20.931 million euro, and we count that there are 3927 scenarios of EVA in 2021 less than this number, the cumulate probability is 78.56%, which means there is 78.56% probability that the company's EVA cannot exceed last year. Therefore, it is not so obvious that the company will obtain a higher EVA than 2020.

Table 4.23 Characteristics of the economic value (in million euro)

	Mean value	Standard deviation	Value at risk 5%	Value at risk 10%
EVA	0.14	30.31	-41.144555	-34.588741

The mean of all EVA scenarios is 0.14 million euro, which is lower than the EVA in 2020. The standard deviation is 30.31 million euro, the average distance of individual scenario deviate from the mean is 30.31 million euro. By calculating the value at risk of 5% and 10%,

we know that 95% probability of EVA will be higher than -41.144555 million euro, and 90% probability of EVA will be higher than -34.588741 million euro.

4.2.5 Sensitivity Analysis of Economic Value Added

A sensitivity analysis can be used to analyze how the change of values of an independent variable impact a particular dependent variable while other variables are unchanged.

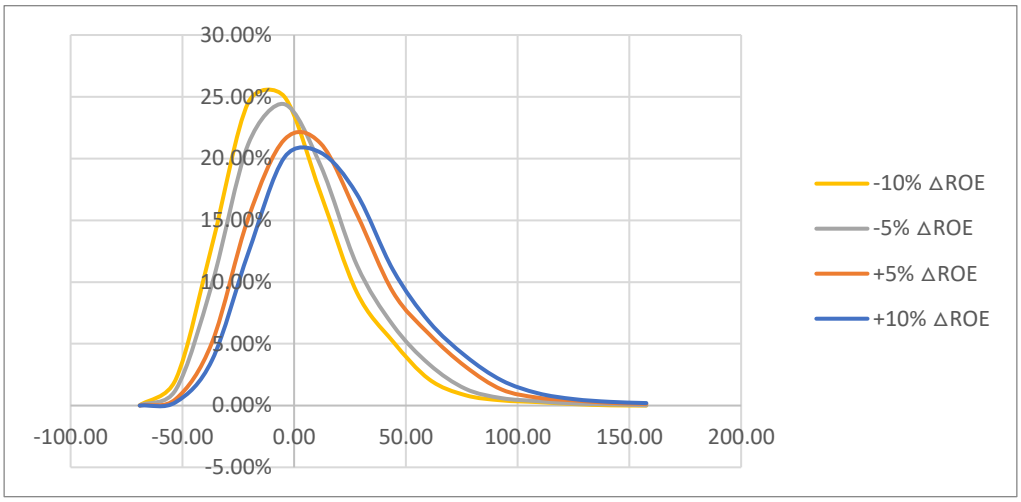
Based on the equation (2.4), we can know that the economic value added of a company depend on its return on equity, cost of equity and value of equity. So the sensitivity analysis is based on these factors. We choose -5%, -10%, 5%, and 10% as the change of those independent variables.

If the return on equity changes, all scenarios of economic value added will be change, and the probability of 5000 scenarios fall in a certain interval will change as well. The table 4.24 and figure 4.25 show part of the probability of EVA corresponding to a certain interval. The part of calculation of the alternatives are in the Annex 8.

Table 4.24 Probability distribution of EVA corresponding to certain interval as the change of return on equity

EVA interval (In million euro)	＜-36.69	-36.69 to 11.87	11.87 to 60.44	60.44 to 109.01	＞109.01
Pr (-10%△ROE)	15.16%	66.70%	16.46%	1.54%	0.14%
Pr (-5%△ROE)	11.18%	65.00%	21.22%	2.32%	0.28%
Pr (+5%△ROE)	5.66%	57.92%	30.48%	5.10%	0.78%
Pr (+10%△ROE)	3.96%	52.94%	34.88	7.06%	1.02%

Figure 4.25 Probability distribution of EVA as the change of return on equity



The figure 4.25 shows that when the ROE becomes smaller, the curve of probability distribution of the EVA shows more positive skewness, higher kurtosis and the EVA become smaller as well, vice versa. From table 4.24 we can find that if ROE decreases 10%, the range in which EVA is most likely to fall is -36.69 to 11.87 million euro, and the probability is 66.70%. The same as other situation, if ROE decreases 5%, and the probability is 65.00%. If ROE increases 5%, and the probability is 57.92%. If ROE increases 10%, and the probability is 52.94%.

Table 4.26 Characteristics of the economic value (in million euro) in the case of change of return on equity

	Mean	Standard deviation	Value at risk 5%	Value at risk 10%
EVA (-10%△ROE)	-10.50	27.09	-47.3984	-41.5389
EVA (-5%△ROE)	-5.18	28.70	-44.2715	-38.0638
EVA (+5%△ROE)	5.46	31.92	-38.0177	-31.1137
EVA (+10%△ROE)	10.78	33.53	-34.8908	-27.6386

The mean of the EVA is -10.50 million euro and the standard deviation is 27.09 million euro if the ROE decreases 10%. The EVA deviate from the mean -10.50 million euro with an average length of 27.09 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -47.3984 million euro, and 90% probability of EVA will be higher than -41.5389 million euro.

The mean of the EVA is -5.18 million euro and the standard deviation is 28.70 million euro if the ROE decreases 5%. The EVA deviate from the mean -5.18 million euro with an average length of 28.70 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -44.2715 million euro, and 90% probability of EVA will be higher than -38.0638 million euro.

The mean of the EVA is 5.46 million euro and the standard deviation is 31.92 million euro if the ROE increases 5%. The EVA deviate from the mean 5.46 million euro with an average length of 31.92 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -38.0177 million euro, and 90% probability of EVA will be higher than -31.1137 million euro.

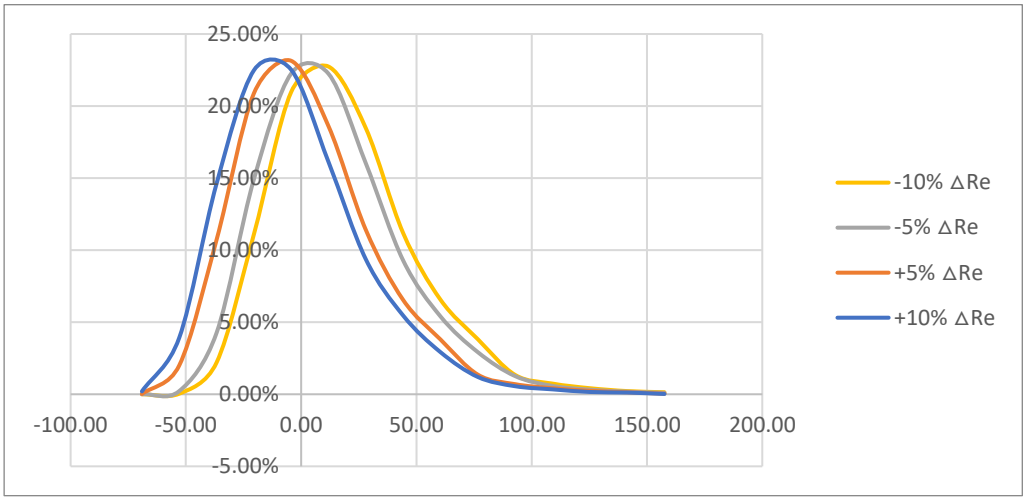
The mean of the EVA is 10.78 million euro and the standard deviation is 33.53 million euro if the ROE increases 10%. The EVA deviate from the mean 10.78 million euro with an average length of 33.53 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -34.8908 million euro, and 90% probability of EVA will be higher than -27.6386 million euro.

Next is to analyze the influence of the cost of equity changes. The table 4.27 and figure 4.28 show part of the probability of EVA corresponding to a certain interval. The part of calculation of the alternatives are in the Annex 9.

Table 4.27 Probability distribution of EVA corresponding to certain interval as the change of cost of equity

EVA interval (In million euro)	＜-36.69	-36.69 to 11.87	11.87 to 60.44	60.44 to 109.01	＞109.01
Pr (-10%△Re)	2.22%	54.84%	36.20%	5.90%	0.78%
Pr (-5%△Re)	4.48%	59.42%	30.70%	4.76%	0.60%
Pr (+5%△Re)	12.74%	62.62%	21.74%	2.48%	0.42%
Pr (+10%△Re)	18.74%	61.12%	17.74%	2.10%	0.30%

Figure 4.28 Probability distribution of EVA as the change of cost of equity



The figure 4.28 shows that when the cost of equity becomes smaller, the probability distribution of the EVA tends to shift to right, and the EVA become larger as well, vice versa. From table 4.27 we can find that if cost of equity decreases 10%, the range in which EVA is most likely to fall is -36.69 to 11.87 million euro, and the probability is 54.84%. The same as other situation, if cost of equity decreases 5%, and the probability is 59.42%. If cost of equity increases 5%, and the probability is 62.62%. If cost of equity increases 10%, and the probability is 61.12%.

Table 4.28 Characteristics of the economic value (in million euro) in the case of change of cost of equity

	Mean	Standard deviation	Value at risk 5%	Value at risk 10%
EVA (-10%△Re)	10.76	30.50	-30.7763	-24.1798
EVA (-5%△Re)	5.45	30.40	-35.9604	-29.3842
EVA (+5%△Re)	-5.17	30.22	-46.3287	-34.6203
EVA (+10%△Re)	-10.49	30.12	-51.5128	-44.9977

The mean of the EVA is 10.76 million euro and the standard deviation is 30.50 million euro if the cost of equity decreases 10%. The EVA deviate from the mean 10.76 million euro with an average length of 30.50 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -30.7763 million euro, and 90% probability of EVA will be higher than -24.1798 million euro.

The mean of the EVA is 5.45 million euro and the standard deviation is 30.40 million euro if the cost of equity decreases 5%. The EVA deviate from the mean 5.45 million euro with an average length of 30.40 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -35.9604 million euro, and 90% probability of EVA will be higher than -29.3842 million euro.

The mean of the EVA is -5.17 million euro and the standard deviation is 30.22 million euro if the cost of equity increases 5%. The EVA deviate from the mean -5.17 million euro with an average length of 30.22 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -46.3287 million euro, and 90% probability of EVA will be higher than -34.6203 million euro.

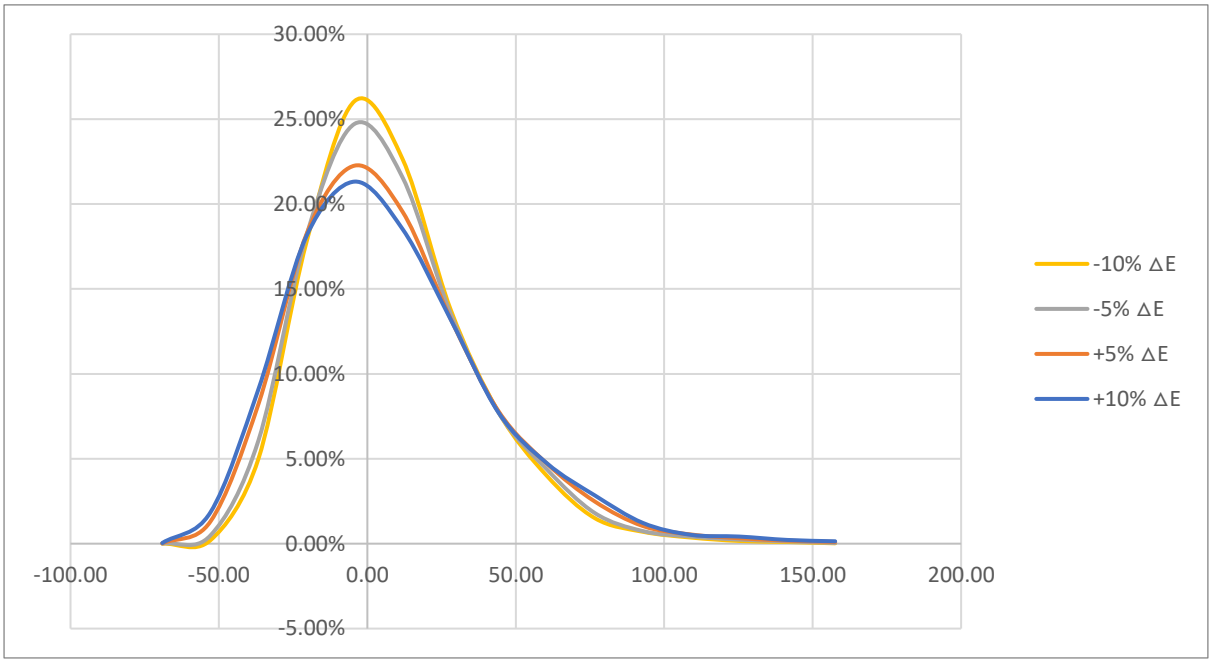
The mean of the EVA is -10.49 million euro and the standard deviation is 30.12 million euro if the cost of equity increases 10%. The EVA deviate from the mean -10.49 million euro with an average length of 30.12 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -51.5128 million euro, and 90% probability of EVA will be higher than -44.9977 million euro.

Last is to analyze the influence of the equity changes. The table 4.29 and figure 4.30 show part of the probability of EVA corresponding to a certain interval. The part of calculation of the alternatives are in the Annex 10.

Table 4.29 Probability distribution of EVA corresponding to certain interval as the change of equity

EVA interval (In million euro)	＜-36.69	-36.69 to 11.87	11.87 to 60.44	60.44 to 109.01	＞109.01
Pr (-10%△E)	5.18%	66.48%	25.50%	2.56%	0.28%
Pr (-5%△E)	6.56%	64.44%	25.62%	2.96%	0.42%
Pr (+5%△E)	9.54%	60.02%	25.74%	4.06%	0.60%
Pr (+10%△E)	10.98%	57.96%	25.64%	4.58%	0.78%

Figure 4.30 Probability distribution of EVA as the change of equity



The figure 4.30 shows that when the equity becomes smaller, the curve of probability distribution of the EVA will be thinner, which means have a higher kurtosis and light tail, vice versa. From table 4.29 we can find that if equity decreases 10%, the range in which EVA is most likely to fall is -36.69 to 11.87 million euro, and the probability is 66.48%. The same as other situation, if equity decreases 5%, and the probability is 64.44%. If equity increases 5%, and the probability is 60.02%. If equity increases 10%, and the probability is 57.96%.

Table 4.31 Characteristics of the economic value (in million euro) in the case of change of equity

	Mean	Standard deviation	Value at risk 5%	Value at risk 10%
EVA (-10%△E)	0.13	27.28	-37.0301	-31.1299
EVA (-5%△E)	0.13	28.79	-39.0873	-32.8593
EVA (+5%△E)	0.15	31.83	-43.2018	-36.3182
EVA (+10%△E)	0.15	33.34	-45.2590	-38.0476

The mean of the EVA is 0.13 million euro and the standard deviation is 27.28 million euro if the equity decreases 10%. The EVA deviate from the mean 0.13 million euro with an average length of 27.28 million euro. By calculating the value at risk of 5% and 10%, there is

95% probability of EVA will be higher than -37.0301 million euro, and 90% probability of EVA will be higher than -31.1299 million euro.

The mean of the EVA is 0.13 million euro and the standard deviation is 28.79 million euro if the equity decreases 5%. The EVA deviate from the mean 0.13 million euro with an average length of 28.79 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -39.0873 million euro, and 90% probability of EVA will be higher than -32.8593 million euro.

The mean of the EVA is 0.15 million euro and the standard deviation is 31.83 million euro if the equity increases 5%. The EVA deviate from the mean 0.15 million euro with an average length of 31.83 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -43.2018 million euro, and 90% probability of EVA will be higher than -36.3182 million euro.

The mean of the EVA is 0.15 million euro and the standard deviation is 33.34 million euro if the equity increases 10%. The EVA deviate from the mean 0.15 million euro with an average length of 33.34 million euro. By calculating the value at risk of 5% and 10%, there is 95% probability of EVA will be higher than -45.2590 million euro, and 90% probability of EVA will be higher than -38.0476 million euro.

4.3 Financial Evaluation Summary

Based on financial analysis on Ubisoft Entertainment SA's past performance, except there are extreme situation during the crisis in 2014 and 2020, generally the revenues have grown steadily. In the past ten years, the average year on year growth rate was 8.895%. Though compare with other entertainment company, such as Activision Blizzard or Electronic Arts, Ubisoft still has a large gap with them, but the size of revenue and growth rate is now in the top 10 of the worlds, and Ubisoft's stock is an available choice as the beta coefficient is around 1 and gradually decreasing, which means the stock price is follow the market volatility and become less volatile.

Generally, the EVA of the company shows a growing trend as the same as the revenues. However, when we disassemble EVA according to the formula, the average return on equity

of the company in the past ten years was 5.56%. and the average cost of equity is 7.41%, which is not good news for the company when the cost rate is higher than return, and it means generally the total EVA of these ten years is negative. The cost of goods sold and the financial cost have a decreasing proportion of total revenues, but the operating cost during the ten years is gradually increasing, not only in the number, but also proportion of total revenue. As a video game player, we may be happy to see the company pay more attention in the development and announcement of the new games, as we feel glad to play the high-quality games. But as an investor, the lower EVA means lower economic profit of the company, we are unhappy to see the company's net income fluctuating or declining due to the continuous increase in operating costs, especially when Ubisoft haven't paid any dividends during these ten years.

The prediction of EVA is based on the company's historical performance. From the analysis in chapter 4.2, the average of predicted total equity in all scenarios is 1816.43 million euro, which is a higher than the 1665 million euro in 2020. The average of predicted return on equity in all scenarios is 5.83%, which is a little lower than the 6.32% in 2020. And the predicted cost of equity is 5.85%, which is a little higher than the 5.06% in 2020. The company's economic value added made in 2021 will most likely be in the range from -20.50 to -4.32 million euro with a probability of 23.44%. With 78.56% probability, the company's EVA may less than the EVA in 2020, which was 20.931 million euro. The probability of EVA falling compared to last year is ever high, so it could say that the company's EVA will be lower than that in 2020, because of the continually growing cost and low return on equity.

From the sensitivity analysis, we know that the three component of EVA calculation has different sensitivity degree on the changing. Generally, the change of return on equity is more sensitive to the change of EVA than the change of cost of equity and the change of equity. The company may need to pay attention to improve return on equity to improve EVA, improve operation efficiency to create more revenue, improve the assets turnover. Not only that, but the company may also need to make more effort on controlling the operating expense.

Based on the data from Statista, the video games market in 2021 will generate total revenues of 180.3 billion USD, up 1.4% over last 2020. With the continuous development of electronic equipment, the game release speed of the global game market is invisibly driven by

the replacement speed of electronic equipment, but the former seems cannot get on the speed. In the past, the vacancy in the game market: mobile games, has been gradually filled and a larger share has been seized. According to statistics, the marketing of mobile games accounts for more than 52% of the overall game industry, which has caused a huge impact on the industry and invisibly require more competitiveness of the industry. Ubisoft follows the trend, for example, create the subsidiary Gameloft SE in 1999, focusing on the video game publishing on mobile platform, gives the players diverse series of games. Meantime, in recent years, hosting the e-sports competition on the game developed by their own company becomes a new way of video game announcement and promotion, the allies such as Riot Games (hosting the League of Legend World Cup) and VALVe (hosting The International DOTA2 Championship) both earn fame and fortune. Ubisoft is late from these, and even though it has the competition such as Six Invitational for Rainbow six: Siege, the residual of market share is not enough as they expected. Therefore, we believe that if Ubisoft can still follow the industrial trend and keep the quality and quantity of their products, it can have a good performance and create a relatively high EVA in the future.

5. Conclusion

Evaluating a performance review of a company can help us understand how a company is doing and where it stands in the industry. By analyzing the company's historical performance, we can predict the company's future development trends, and at the same time help managers to better plan future operations and management, and improve the company's industry competitiveness based on factors that affect performance.

The aim of the thesis is to evaluate the past performance and predict the future financial performance of the Ubisoft Entertainment S.A. based on economic value added. Ubisoft Entertainment S.A. is a company of video game industry in France, and the company ranks in the top 10 in the industry all over the worlds. The thesis is divided into five chapters, chapter 1 is the introduction of this thesis. In chapter 2, there is a description about the methods of financial evaluation with a focus on the economic value added, and describes the principles of determining the cost of capital and briefly characterizes the market value added indicator. The third chapter is about the methodologies applied in practical part, including Monte Carlo simulation method and other steps of prediction. Chapter 4 is the practical part. It contains the past financial performance evaluation of Ubisoft and the financial performance prediction. Chapter 5 is the conclusion.

The past financial performance evaluation is based on the economic value added from 2011 to 2020. Based on the analysis in chapter 4.1, the company cannot create good EVA in the past ten years, after the pain of the economic crisis and the new crisis in 2014 and 2020, the company cannot make positive net income in those years. On one hand, it’s because the high cost of equity and low return on equity of the company. In the past ten years, the company’s average cost of equity was higher than the return on equity, luckily in recent years this situation was improving. The average beta coefficient is a little bit higher than 1 but continuing decreasing, which means that the risk of Ubisoft stock is higher than the risk of the market portfolio, so investors’ expected return is decreasing as the risk is decreasing.

Generally, the total revenue was continuing growth, mainly attributed by increase of sale. But due to the high proportion of operating cost and expenses, the net income has

increased but not a large degree during the past ten years, and also the company was lack of the ability to deal with the crisis, so in some years the net income was negative.

In the influence analysis, we found that the ratio of EBIT to revenue contribute the most to the ROE growth, in other word, the control of operating cost and expenses proportion. The company's investment in researching and developing and marketing have led to sales growth, however, the speed of releasing new products cannot contribute to the controlling costs, but even worse. Ubisoft has tried to increase new products in the old series and new IP, with the cooperation with Sony, Microsoft and other industrial leader, they can guarantee the future revenue, but the high cost and expenses need to be improved.

Financial performance prediction of Ubisoft is based on economic value added prediction for 2021. We created 5000 scenarios of revenues, estimated the financial plan of income statement based on these scenarios, estimated the future cost of equity, then predicted the economic value added. Based on the analysis in chapter 4.2, with a probability of 23.44%, the economic value added is most likely to fall in the interval from -20.50 to -4.32 million euro, and with a probability of 20.38%, the economic value added will fall in the interval from -4.32 to 11.87 million euro. The average economic value added is 0.14 million euro and the average distance of deviation from the mean is 30.31 million euro. And there is a 21.44% chance that EVA in 2021 will exceed the EVA in 2020.

Changes in the external and internal environment of the company and inaccurate estimates may lead to changes in EVA. Through sensitivity analysis, we choose -10%, - 5%, 5%, and 10% four changes of the main items: return on equity, cost of equity and equity. Among these items, ROE changes have a greater impact on EVA, and higher ROE can create higher economic value added. The company should pay attention to controlling operating cost expenses, maintain product innovation advantages, create higher sales, and pay attention to the utilization efficiency of assets.

Due to the time of concluding this analysis is at the start of year 2022, the analyzed company Ubisoft have disclosed the revenue for the first three quarters in 2021, which is 352.8, 398.5 and 665.9 million euro, in sum 1417.2 million euro, which is higher than average

revenue for the first three quarters of the previous decade, which is 1102.53 million euro, but lower than the last year 1722.01 million euro, generally the revenue of each quarter still follow the previous seasonal changing. The situation of COVID pandemic has eased, but there are still recurrences, the development of the entertainment industry may come into a turning point: game development process can go smoothly as before, but quarantine measures increase the leisure time at home and increase the consumption of video games, which is a good signal that creates a positive impact on the company's main source of revenue, the revenue of the last quarter in 2021 could be higher than the prediction.

In conclusion, firstly, due to the existence of many uncertain parameter selections in traditional revenue forecasting methods, and the diversity of internal refinement in the entertainment industry, internal and external factors have a greater impact on parameter selection and final evaluation results. Monte Carlo model is used to introduce EVA evaluation and prediction, from the perspective of statistical and probability, it could simplify the variables that need to be estimated in the model, which can reduce the uncertainty of parameters and the subjective influence of evaluation results, and provide new ideas for solving uncertainty and subjectivity problems in evaluation practice.

Secondly, this thesis selects the leading enterprises in the entertainment industry as the evaluation object, and the predicted value is not much different from the actual public situation of the enterprise, the evaluation results can more objectively reflect the corporate value, which strongly shows that the Monte Carlo simulation as EVA prediction method can be applied to the enterprise value of this type of industry, and also contribute to the credibility of the evaluation industry.

However, due to the limited level of the author, there are still limitations in evaluation and model application:

Firstly, this thesis focuses on analyzing the overall value of the financial performance from Ubisoft's financial statements, but in the evaluation practice, the evaluation object is not limited to the overall value, but also the equity value and investment value from other indicators. Therefore, whether the Monte Carlo simulation as EVA prediction method in this

thesis can still be used for the assessment of other value types requires further research and validation.

Secondly, the application of Monte Carlo simulation requires random variables to be independent of each other. In order to better verify the feasibility of this technology, the degree of variables correlation between random variables is verified from a quantitative point of view, thereby ensuring that the values of random numbers are independent. However, whether the selected key variables in the simulation are relevant, and whether it is related to the operation and development of Ubisoft company itself, still needs the support of further research.

Thirdly, the defects of the Monte Carlo model itself have a certain influence on the final evaluation results. As the variable of the normal distribution are completely random, some data may deviate greatly from the actual situation during the experiment. The number of 5000 scenarios is relatively small, and there may still be some deviation data, although the proportion of deviation data is very small, it may also cause some deviations between the evaluation results and the true value.

In general, according to Monte Carlo simulation, Ubisoft Entertainment S.A. had a relatively good financial performance in the past ten years, and it still shows a good tendency of increasing revenue and making positive EVA in the year 2021, and it could be good choice for the investor.

Bibliography

Professional book

[1] BOWLIN, Oswald Doniece, John D. MARTIN a David F. SCOTT. *Guide to financial analysis.* 2nd ed. New York: McGraw-Hill, c1990. McGraw-Hill finance guide series. ISBN 0-07-006805-4.

[2] CRÉPEY, Stéphane. *Financial Modeling, A Backward Stochastic Differential Equations Perspective*, 2013. ISBN 978-3-642-37113-4

[3] DLUHOŠOVÁ, Dana, Miroslav ČULÍK, Petr GURNÝ, Aleš KRESTA, Jiří VALECKÝ a Zdeněk ZMEŠKAL. *Financial management and decision-making of a company: analysis, investing, valuation, sensitivity, risk, flexibility.* Ostrava: VŠB-TU Ostrava, 2014. Series on advanced economic issues, Faculty of Economics, VŠB-TU Ostrava, 2014, vol. 28. ISBN 978-80-248-3619-5.

[4] GLASSERMAN, Paul. *Monte Carlo methods in financial engineering.* New York: Springer, c2004. Applications of mathematics: stochastic modelling and applied probability, 53. ISBN 0-387-00451-3.

[5] GRANT, James L. *Foundations of economic value added.* Second edition. Hoboken: John Wiley & Sons, [2003]. The Frank J. Fabozzi series. ISBN 0-471-23483-4.

[6] HITCHNER, R. James. *Financial Valuation, Applications and Models.* 3rd ed. New Jersey: John Wiley &Sons, 2011. ISBN: 978-0470506875.

[7] MCCLAVE, James T., P. George BENSON a Terry SINCICH. *Statistics for business and economics.* Edition 13. Harlow: Pearson, [2018]. ISBN 978-1-292-22708-5.

[8] ZMEŠKAL, Zdeněk, Dana DLUHOŠOVÁ a Tomáš TICHÝ. *Financial models*. Ostrava: VSB - Technical University of Ostrava, Faculty of Economics, 2004. ISBN 80-248-0754-8.

Articles and online sources

[9] Economic value added definition and calculation [online]. Available on:

https://en.wikipedia.org/wiki/Economic_value_added

[10] France implied market risk premia. [online]. Available on:

http://www.market-risk-premia.com/fr.html

[11] France government bond yield curve [online]. Available on:

https://fred.stlouisfed.org/series/INTGSTFRM193N

[12] Stakeholder Approach to Strategic Management [online]. Available on:

https://www.researchgate.net/publication/228320877_A_Stakeholder_Approach_to_Strategic_Management

[13] Ubisoft Entertainment S.A. financial statement. [online]. Available on:

https://www.ubisoft.com/en-us/company/about-us/investors

[14] Video game industry – Statistic and Fact [online]. Available on:

https://www.statista.com/topics/868/video-games/

List of abbreviations

A: Assets

β_E: Coefficient of the sensitivity of the additional return on equity to the additional return on the market portfolio

BVE: Book value of shareholders' equity

C: Capital invested in the firm

D: Interest-bearing debt

DIV: Dividend

E: Equity

$E_{(RM)}$: Expected return on the market portfolio

EAT: Earnings after taxes

EBT: Earnings before taxes

EBIT: Earnings before interests and taxes

EBITDA: Earnings before interest, taxes, depreciation, and amortization added back

EPS: Earning per share

EVA: Economic value added

g: Dividend growth rate

KWACC: Cash flow created in the business process of the corporate

KPI: Key performance indicators

MV: Market value of the firm

MVA: Market value added

MVE: Market value of equity

NOPAT: Net operating profit after tax

P: Market price of the stock

PV: Present value

Re: Cost of equity

Rev: Revenue

R_D: cost of interest-bearing debt

R_E: Cost of equity

R_f: Risk free rate

R_{POD}: Risk premium for the business risk of the company

$R_{FINSTAB}$: Risk premium for financial stability

R_{LA}: Risk premium for the size of the business

ROE: Return on equity

ROCE: Return on capital employed

TC: Total capital

tr: Income tax rate

VL: Corporate value in debt

VU: No debt corporate value

WACC: Weighted average cost of capital

List of Annexes

Annex 1: Balance sheet of Ubisoft Entertainment S.A. from 2010 to 2021 (in million euro)

	2021/3/31	2020/3/31	2019/3/31
goodwill	220.7	334.6	290.721
other intangible assets	1453.2	1115.3	882.925
property, plant and equipment	199.8	174.4	159.958
investments in associates	282.1	229.9	0.007
non-current financial assets	16.1	13.7	8.66
deferrers tax assets	173.1	169.3	168.443
Total non-current assets	2345	2037.2	1510.714
inventory	23.1	12.4	31.88
trade receivables	342.7	307.1	476.641
other receivables	260.6	127.5	179.982
other current financial assets	0	0.5	0.184
current tax assets	45.7	41	39.555
cash and cash equivalents	1867.6	1079.2	1049.803
Total current assets	2539.8	1567.6	1778.045
Total Assets	4884.8	3604.8	3288.759
capital	9.6	9.4	8.65
premiums	556	475.4	335.759
consolidated reserves	987.1	955.4	475.624
consolidated earnings	103.1	-125.6	99.958
Total Equity	1665	1321.7	920.018
provisions	5	3.1	2.469
employee benefit	21.6	15.8	14.382
long-term borrowings and other financial liabilities	1894.9	1176.2	890.366
deferred tax liabilities	192.9	169.1	127.903
Total non-current liabilities	2144.3	1364.2	1035.119
short-term borrowings and other financial liabilities	200	246.9	453.299
trade payables	152	139.2	188.787
other liabilities	737.8	517.7	664.617
current tax liabilities	15.8	15.1	26.918
Total current liabilities	1105.5	918.9	1333.621
Total Liabilities	3219.8	2283.1	2368.74
Total Liabilities and Equity	4884.8	3604.8	3288.759

	2018/3/31	2017/3/31	2016/3/31
goodwill	259.461	180.735	106.194
other intangible assets	782.402	736.465	647.602
property, plant and equipment	114.116	106.375	83.946
investments in associates	-0.289	-0.068	0
non-current financial assets	106.895	5.478	4.339
deferrers tax assets	84.181	88.831	122.193
Total non-current assets	1346.767	1117.815	964.274
inventory	20.264	25.359	19.374
trade receivables	435.573	405.557	419.577
other receivables	208.778	146.467	100.985
other current financial assets	8.32	1.131	13.78
current tax assets	38.481	32.967	41.464
cash and cash equivalents	746.939	852.699	461.375
Total current assets	1458.355	1464.18	1056.555
Total Assets	2805.122	2581.995	2020.829
capital	8.652	8.752	8.71
premiums	234.123	280.975	215.125
consolidated reserves	507.102	736.276	701.267
consolidated earnings	139.452	107.813	93.408
Total Equity	889.33	1133.816	1018.51
provisions	3.074	4.246	8.888
employee benefit	10.289	9.079	6.618
long-term borrowings and other financial liabilities	933.629	641.962	277.383
deferred tax liabilities	96.047	72.774	47.648
Total non-current liabilities	1043.039	728.061	340.537
short-term borrowings and other financial liabilities	361.538	292.148	228.218
trade payables	176.613	178.282	206.246
other liabilities	321.935	219.817	213.807
current tax liabilities	12.667	29.872	13.511
Total current liabilities	872.753	720.119	661.782
Total Liabilities	1915.792	1448.18	1002.319
Total Liabilities and Equity	2805.122	2581.995	2020.829

	2015/3/31	2014/3/31	2013/3/31
goodwill	129.906	138.335	145.919
other intangible assets	572.225	598.523	547.215
property, plant and equipment	80.983	56.74	46.489
investments in associates	0	0	0.146
non-current financial assets	4.162	3.566	3.844
deferrers tax assets	134.954	116.226	92.919
Total non-current assets	922.23	913.391	836.802
inventory	18.425	21.343	17.731
trade receivables	23.904	73.32	36.619
other receivables	113.855	74.812	105.744
other current financial assets	4.919	1.532	6.85
current tax assets	12.38	16.972	15.987
cash and cash equivalents	656.661	237.946	237.704
Total current assets	830.144	425.925	420.635
Total Assets	1752.374	1339.316	1257.437
capital	8.478	8.2	7.441
premiums	180.515	337.25	275.815
consolidated reserves	703.378	530.123	490.14
consolidated earnings	87.011	-65.525	64.831
Total Equity	979.382	810.048	838.227
provisions	7.497	4.304	5.67
employee benefit	5.43	3.715	2.997
long-term borrowings and other financial liabilities	275.739	63.439	24.457
deferred tax liabilities	48.944	40.956	49.181
Total non-current liabilities	337.61	112.415	82.305
short-term borrowings and other financial liabilities	183.226	189.323	108.759
trade payables	94.919	93.643	75.963
other liabilities	149.614	128.884	148.337
current tax liabilities	7.623	5.003	3.847
Total current liabilities	435.382	416.853	336.906
Total Liabilities	772.992	529.268	419.211
Total Liabilities and Equity	1752.374	1339.316	1257.437

	2012/3/31	2011/3/31	2010/3/31
goodwill	147.773	108.125	106.498
other intangible assets	520.452	451.701	526.383
property, plant and equipment	39.177	34.824	31.8
investments in associates	0.404	0.393	0.393
non-current financial assets	3.342	3.335	3.613
deferrers tax assets	92.325	82.525	65.884
Total non-current assets	803.473	680.903	734.571
inventory	20.012	35.217	47.973
trade receivables	-13.143	49.263	68.748
other receivables	83.592	59.478	89.159
other current financial assets	15.287	29.112	33.271
current tax assets	13.691	10.574	25.08
cash and cash equivalents	175.703	193.354	185.316
Total current assets	295.142	376.998	449.547
Total Assets	**1098.616**	**1057.901**	**1184.118**
capital	7.369	7.341	7.32
premiums	265.358	527.469	512.444
consolidated reserves	452.659	231.305	285.38
consolidated earnings	37.321	-52.12	-43.672
Total Equity	**762.707**	**713.995**	**761.472**
provisions	3.918	2.295	2.215
employee benefit	1.568	1.196	1.71
long-term borrowings and other financial liabilities	1.479	1.894	22.548
deferred tax liabilities	37.396	30.99	32.921
Total non-current liabilities	44.361	36.375	59.394
short-term borrowings and other financial liabilities	91.073	92.732	121.784
trade payables	80.8	110.947	144.499
other liabilities	116.531	96.847	93.617
current tax liabilities	3.145	7.005	3.352
Total current liabilities	291.549	307.531	363.252
Total Liabilities	**335.91**	**343.906**	**422.646**
Total Liabilities and Equity	**1098.616**	**1057.901**	**1184.118**

Annex 2: Income statement of Ubisoft Entertainment S.A. from 2010 to 2021 (in million euro)

	2021/3/31	2020/3/31	2019/3/31	2018/3/31	2017/3/31	2016/3/31
Revenue	**2223.8**	**1594.8**	**1845.522**	**1731.894**	**1459.874**	**1393.997**
cost of goods sold	-325.7	-253.1	-328.972	-296.820	-270.887	-305.065
Gross Margin	**1898.1**	**1341.8**	**1516.550**	**1435.074**	**1188.987**	**1088.932**
research and development expenses	-827.1	-720.8	-740.969	-690.592	-548.735	-509.779
marketing costs	-442.8	-386.6	-410.070	-339.274	-316.806	-305.735
general and administrative expenses	-228.4	-193.0	-157.295	-144.649	-122.538	-117.296
Current Operating Income	**399.8**	**41.3**	**208.216**	**260.558**	**200.907**	**156.122**
other non-operating income or expenses	-110.4	-100.8	-49.231	-38.241	-25.094	-19.334
Operating income	**289.4**	**-59.5**	**158.985**	**222.317**	**175.813**	**136.788**
net borrowing costs	-17.4	-13.9	-17.140	-15.909	-10.816	-7.440
net foreign exchange gain/losses	-8.2	-3.8	-5.311	-5.747	-2.288	-5.168
other financial income and expenses	-26.0	-1.4	12.600	8.300	-3.100	-1.100
Net Financial Income	**-51.6**	**-19.1**	**-10.877**	**-13.400**	**-16.205**	**-13.726**
share in profit of associates	0.0	0.0	0.294	-0.224	-0.338	0.000
Income taxes	-132.6	-45.7	-48.418	-69.241	-51.457	-29.654
Consolidated net income	**105.2**	**-124.2**	**99.985**	**139.452**	**107.813**	**93.408**
Basic EPS	**0.87**	**-1.12**	**0.93**	**1.26**	**0.98**	**0.86**
Diluted EPS	**0.85**	**-1.12**	**0.89**	**1.18**	**0.92**	**0.82**
EBT	237.8	-78.5	148.403	208.693	159.270	123.062
EBIT	289.4	-59.5	159.0	222.3	175.8	136.8
Tax/EBT	**0.5576114**	**-0.582166**	**0.3262603**	**0.331784**	**0.3230803**	**0.240968**

	2015/3/31	2014/3/31	2013/3/31	2012/3/31	2011/3/31	2010/3/31
Revenue	**1463.753**	**1007.064**	**1256.164**	**1061.296**	**1038.826**	**870.954**
cost of goods sold	-337.073	-285.251	-342.655	-343.162	-365.208	-358.118
Gross Margin	**1126.680**	**721.813**	**913.509**	**718.134**	**673.618**	**512.836**
research and development expenses	-580.554	-433.900	-435.011	-355.008	-363.505	-309.403
marketing costs	-284.965	-279.957	-304.941	-241.027	-212.868	-196.115
general and administrative expenses	-100.051	-83.269	-81.360	-76.477	-67.880	-66.894
Current Operating Income	**161.110**	**-75.313**	**92.197**	**45.623**	**29.365**	**-59.576**
other non-operating income or expenses	-21.717	-22.627	-4.293	0.000	-109.851	-12.519
Operating income	**139.393**	**-97.940**	**87.904**	**45.622**	**-80.486**	**-72.095**
net borrowing costs	-4.766	-5.785	-4.629	-2.527	-5.087	-0.546
net foreign exchange gain/losses	1.159	-1.143	0.709	-3.404	-4.310	5.246
other financial income and expenses	4.300	17.300	7.919	8.397	5.718	0.050
Net Financial Income	**0.712**	**10.334**	**3.998**	**2.466**	**-3.679**	**4.750**
share in profit of associates	0.000	0.000	0.012	0.010	0.000	0.050
Income taxes	-53.094	22.081	-27.083	-10.778	32.045	23.624
Consolidated net income	**87.011**	**-65.525**	**64.831**	**37.321**	**-52.120**	**-43.671**
Basic EPS	**0.81**	**-0.64**	**0.68**	**0.40**	**-0.55**	**-0.46**
Diluted EPS	**0.77**	**-0.61**	**0.67**	**0.39**	**-0.54**	**-0.45**
EBT	140.105	-87.606	91.914	48.099	-84.165	-67.295
EBIT	139.4	-97.9	87.9	45.6	-80.5	-72.1
Tax/EBT	**0.3789586**	**0.2520489**	**0.2946559**	**0.2240795**	**0.3807402**	**0.3510513**

Annex 3: Seasonal adjustment of revenues

	Seasonal Rrevenues	Deseasonalized Revenues				
2011q1	103	162.3893268				
2011q2	146	247.4168112				
2011q3	652	376.1535022				
2011q4	161	154.4676242				
2012q1	131	206.5339981				
2012q2	148	250.8060826		slop	7.6049	
2012q3	802	462.6918846		intercept	220.07	
2012q4	175	167.8995915				
2013q1	76	119.8212508		average	ki	Ki
2013q2	217	367.7359454	q1	364.5631	0.630508	0.634278
2013q3	520	299.9997257	q2	372.168	0.58659	0.590097
2013q4	194.1	186.2246326	q3	379.7729	1.723032	1.733335
2014q1	360.1	567.7320056	q4	387.3778	1.036094	1.04229
2014q2	124.1	210.3042895		Σki	3.976225	
2014q3	809.7	467.1341883				
2014q4	169.9	163.0065177				
2015q1	96.6	152.2991162				
2015q2	110.7	187.5961712				
2015q3	561.8	324.1150883				
2015q4	624.9	599.5454556				
2016q1	139.1	219.3044209				
2016q2	142.2	240.9771956				
2016q3	529.9	305.7112589				
2016q4	648.6	622.2838575				
2017q1	202.1	318.6299315				
2017q2	264.2	447.7227501				
2017q3	725	418.2688483				
2017q4	540.7	518.7617665				
2018q1	400	630.6381623				
2018q2	367.1	622.1007629				
2018q3	562	324.2304728				
2018q4	516.5	495.5436515				
2019q1	363.4	572.9347704				
2019q2	334.1	566.1777851				
2019q3	416.2	240.1151651				
2019q4	481.1	461.5799627				
2020q1	427.3	673.6792168				
2020q2	329.7	558.721388				
2020q3	965.01	556.7360294				
2020q4	501.8	481.4400858				

Annex 4: Part of the scenarios of revenues

random value	q1	q2	q3	q4	**Total revenue**
-1.06825	220.9009	211.2409	637.7838	394.1994	**1464.125**
0.84352	388.0496	371.0802	1120.374	692.4776	**2571.982**
-0.09865	293.9662	281.111	848.7374	524.585	**1948.4**
-0.8911	232.7398	222.5621	671.9651	415.3262	**1542.593**
0.174883	318.6453	304.7109	919.9907	568.6251	**2111.972**
-0.83341	236.7308	226.3786	683.4878	422.448	**1569.045**
-1.46759	196.3746	187.7871	566.9715	350.432	**1301.565**
-0.45709	264.4963	252.9299	763.6523	471.9959	**1753.074**
-2.69596	136.7301	130.7509	394.7663	243.996	**906.2433**
-1.24997	209.3815	200.2253	604.5251	373.6431	**1387.775**
0.029112	305.246	291.8976	881.3044	544.714	**2023.162**
-0.6812	247.5916	236.7644	714.8449	441.8292	**1641.03**
-0.24654	281.4287	269.1219	812.5394	502.2119	**1865.302**
0.438743	344.4127	329.3515	994.3864	614.6073	**2282.758**
0.553244	356.2332	340.6552	1028.515	635.7011	**2361.104**
-0.0975	294.0661	281.2066	849.026	524.7634	**1949.062**
1.295714	443.3678	423.9793	1280.089	791.1934	**2938.629**
-1.57429	190.2954	181.9738	549.4198	339.5837	**1261.273**
1.782992	511.8368	489.4542	1477.772	913.3769	**3392.44**
-0.80283	238.8736	228.4276	689.6744	426.2718	**1583.247**
1.033043	410.3406	392.3964	1184.733	732.2562	**2719.726**
-0.08436	295.2067	282.2973	852.3191	526.7988	**1956.622**
-0.05898	297.4236	284.4173	858.7197	530.7549	**1971.316**
2.384768	611.1583	584.4323	1764.533	1090.617	**4050.74**
1.403505	457.6785	437.6642	1321.407	816.7309	**3033.48**
1.219639	433.5381	414.5795	1251.709	773.6522	**2873.478**
0.524673	353.2462	337.7987	1019.89	630.3707	**2341.306**
0.443549	344.901	329.8184	995.796	615.4786	**2285.994**
-0.35529	272.5523	260.6336	786.9115	486.3718	**1806.469**
0.053996	307.4927	294.0461	887.7913	548.7233	**2038.053**
0.609502	362.1888	346.3503	1045.709	646.3288	**2400.577**
-0.23662	282.253	269.9101	814.9193	503.6828	**1870.765**
1.177132	428.1408	409.4182	1236.126	764.0208	**2837.706**
-0.76805	241.3349	230.7813	696.7807	430.6641	**1599.561**
0.157974	317.0612	303.1962	915.4174	565.7984	**2101.473**
2.356792	606.1401	579.6336	1750.044	1081.662	**4017.48**
-0.78709	239.9841	229.4896	692.8808	428.2536	**1590.608**
1.367744	452.8802	433.0757	1307.553	808.1684	**3001.677**
-0.00302	302.3689	289.1463	872.9978	539.5798	**2004.093**

Annex 5: Part of the scenarios of income statement

Cost of goods sold	Operating cost and expenses	Non-operating income or expenses	Net Financial Income	Tax	**Consolidated net income**
251.6926	1036.819	58.95067	20.01888	22.37036	**74.27356**
442.1404	1821.347	103.5568	35.16654	39.29731	**130.474**
334.9425	1379.758	78.44921	26.64034	29.76959	**98.84031**
265.1818	1092.386	62.11007	21.09178	23.56928	**78.25418**
363.0617	1495.591	85.0352	28.87685	32.26882	**107.1382**
269.7291	1111.118	63.17511	21.45345	23.97344	**79.59605**
223.7475	921.7024	52.40546	17.79622	19.88661	**66.02707**
301.3649	1241.438	70.58476	23.96967	26.78522	**88.93167**
155.7891	641.7555	36.48845	12.391	13.84649	**45.97279**
238.5675	982.7517	55.87656	18.97496	21.20381	**70.4004**
347.7947	1432.7	81.45941	27.66256	30.91189	**102.6329**
282.1037	1162.094	66.07347	22.4377	25.0733	**83.24777**
320.6575	1320.912	75.10342	25.50415	28.49995	**94.62486**
392.4209	1616.533	91.91163	31.212	34.87826	**115.802**
405.8891	1672.014	95.06611	32.28322	36.07531	**119.7764**
335.0565	1380.227	78.4759	26.6494	29.77972	**98.87393**
505.1695	2080.988	118.3193	40.17969	44.89932	**149.0737**
216.821	893.1693	50.78315	17.2453	19.27099	**63.98308**
583.1825	2402.354	136.5912	46.38461	51.83309	**172.095**
272.1705	1121.175	63.74694	21.64764	24.19044	**80.31652**
467.5386	1925.972	109.5055	37.18664	41.55469	**137.9689**
336.356	1385.58	78.78028	26.75276	29.89523	**99.25743**
338.8819	1395.985	79.37189	26.95367	30.11973	**100.0028**
696.3485	2868.528	163.0966	55.3855	61.89126	**205.4899**
521.4749	2148.157	122.1383	41.47657	46.34854	**153.8853**
493.9696	2034.851	115.696	39.28888	43.90387	**145.7686**
402.4857	1657.994	94.26897	32.01252	35.77281	**118.7721**
392.9772	1618.825	92.04192	31.25624	34.9277	**115.9661**
310.5438	1279.25	72.73462	24.69973	27.60104	**91.64034**
350.3546	1443.246	82.05899	27.86617	31.13942	**103.3884**
412.6748	1699.967	96.65543	32.82293	36.67842	**121.7788**
321.5967	1324.781	75.32339	25.57885	28.58342	**94.902**
487.82	2009.519	114.2557	38.79976	43.3573	**143.9539**
274.9749	1132.728	64.40378	21.87069	24.43969	**81.14409**
361.2569	1488.157	84.61248	28.7333	32.10841	**106.6056**
690.6308	2844.975	161.7574	54.93073	61.38307	**203.8026**
273.4359	1126.388	64.04331	21.74828	24.3029	**80.68992**
516.0078	2125.635	120.8578	41.04174	45.86263	**152.272**

Annex 6: Part of the scenarios of equity

share capital	premiums	consolidated reserves	consolidated earnings	**Total Equity**
9.861043	558.9366	1141.245	74.27356	**1784.316**
9.861043	558.9366	1141.245	130.474	**1840.516**
9.861043	558.9366	1141.245	98.84031	**1808.883**
9.861043	558.9366	1141.245	78.25418	**1788.297**
9.861043	558.9366	1141.245	107.1382	**1817.181**
9.861043	558.9366	1141.245	79.59605	**1789.638**
9.861043	558.9366	1141.245	66.02707	**1776.069**
9.861043	558.9366	1141.245	88.93167	**1798.974**
9.861043	558.9366	1141.245	45.97279	**1756.015**
9.861043	558.9366	1141.245	70.4004	**1780.443**
9.861043	558.9366	1141.245	102.6329	**1812.675**
9.861043	558.9366	1141.245	83.24777	**1793.29**
9.861043	558.9366	1141.245	94.62486	**1804.667**
9.861043	558.9366	1141.245	115.802	**1825.844**
9.861043	558.9366	1141.245	119.7764	**1829.819**
9.861043	558.9366	1141.245	98.87393	**1808.916**
9.861043	558.9366	1141.245	149.0737	**1859.116**
9.861043	558.9366	1141.245	63.98308	**1774.025**
9.861043	558.9366	1141.245	172.095	**1882.137**
9.861043	558.9366	1141.245	80.31652	**1790.359**
9.861043	558.9366	1141.245	137.9689	**1848.011**
9.861043	558.9366	1141.245	99.25743	**1809.3**
9.861043	558.9366	1141.245	100.0028	**1810.045**
9.861043	558.9366	1141.245	205.4899	**1915.532**
9.861043	558.9366	1141.245	153.8853	**1863.928**
9.861043	558.9366	1141.245	145.7686	**1855.811**
9.861043	558.9366	1141.245	118.7721	**1828.814**
9.861043	558.9366	1141.245	115.9661	**1826.008**
9.861043	558.9366	1141.245	91.64034	**1801.683**
9.861043	558.9366	1141.245	103.3884	**1813.431**
9.861043	558.9366	1141.245	121.7788	**1831.821**
9.861043	558.9366	1141.245	94.902	**1804.944**
9.861043	558.9366	1141.245	143.9539	**1853.996**
9.861043	558.9366	1141.245	81.14409	**1791.186**
9.861043	558.9366	1141.245	106.6056	**1816.648**
9.861043	558.9366	1141.245	203.8026	**1913.845**
9.861043	558.9366	1141.245	80.68992	**1790.732**
9.861043	558.9366	1141.245	152.272	**1862.314**
9.861043	558.9366	1141.245	101.6656	**1811.708**

Annex 7: Part of the scenarios of predicted EVA

Total Equity	ROE	Re	**EVA=(ROE-Re)*E**
1784.316	4.16%	5.85%	**-30.0955**
1840.516	7.09%	5.85%	**22.81766**
1808.883	5.46%	5.85%	**-6.96569**
1788.297	4.38%	5.85%	**-26.3477**
1817.181	5.90%	5.85%	**0.846806**
1789.638	4.45%	5.85%	**-25.0843**
1776.069	3.72%	5.85%	**-37.8596**
1798.974	4.94%	5.85%	**-16.2948**
1756.015	2.62%	5.85%	**-56.7409**
1780.443	3.95%	5.85%	**-33.7421**
1812.675	5.66%	5.85%	**-3.39491**
1793.29	4.64%	5.85%	**-21.6462**
1804.667	5.24%	5.85%	**-10.9346**
1825.844	6.34%	5.85%	**9.003836**
1829.819	6.55%	5.85%	**12.74578**
1808.916	5.47%	5.85%	**-6.93404**
1859.116	8.02%	5.85%	**40.32938**
1774.025	3.61%	5.85%	**-39.784**
1882.137	9.14%	5.85%	**62.00416**
1790.359	4.49%	5.85%	**-24.406**
1848.011	7.47%	5.85%	**29.87419**
1809.3	5.49%	5.85%	**-6.57298**
1810.045	5.52%	5.85%	**-5.87119**
1915.532	10.73%	5.85%	**93.44569**
1863.928	8.26%	5.85%	**44.85962**
1855.811	7.85%	5.85%	**37.21765**
1828.814	6.49%	5.85%	**11.87019**
1826.008	6.35%	5.85%	**9.158393**
1801.683	5.09%	5.85%	**-13.7445**
1813.431	5.70%	5.85%	**-2.68367**
1831.821	6.65%	5.85%	**14.63108**
1804.944	5.26%	5.85%	**-10.6736**
1853.996	7.76%	5.85%	**35.50909**
1791.186	4.53%	5.85%	**-23.6268**
1816.648	5.87%	5.85%	**0.345364**
1913.845	10.65%	5.85%	**91.85712**
1790.732	4.51%	5.85%	**-24.0544**
1862.314	8.18%	5.85%	**43.34066**
1811.708	5.61%	5.85%	**-4.30569**

Annex 8: Part of the scenarios of sensitivity when changing ROE

Total Equity	Re	-10% △ROE	EVA (-10%△ROE)	-5% △ROE	EVA (-5%△ROE)
1784.316	5.85%	3.75%	-37.44861	3.95%	-33.73493
1840.516	5.85%	6.38%	9.84682	6.73%	16.37052
1808.883	5.85%	4.92%	-16.77448	5.19%	-11.83247
1788.297	5.85%	3.94%	-34.09873	4.16%	-30.18602
1817.181	5.85%	5.31%	-9.79142	5.60%	-4.43452
1789.638	5.85%	4.00%	-32.96947	4.23%	-28.98967
1776.069	5.85%	3.35%	-44.38844	3.53%	-41.08708
1798.974	5.85%	4.45%	-25.11309	4.70%	-20.66651
1756.015	5.85%	2.36%	-61.26510	2.49%	-58.96646
1780.443	5.85%	3.56%	-40.70806	3.76%	-37.18804
1812.675	5.85%	5.10%	-13.58281	5.38%	-8.45116
1793.29	5.85%	4.18%	-29.89637	4.41%	-25.73398
1804.667	5.85%	4.72%	-20.32200	4.98%	-15.59076
1825.844	5.85%	5.71%	-2.50041	6.03%	3.28968
1829.819	5.85%	5.89%	0.84425	6.22%	6.83307
1808.916	5.85%	4.92%	-16.74619	5.19%	-11.80250
1859.116	5.85%	7.22%	25.49935	7.62%	32.95303
Total Equity	Re	+5% △ROE	EVA (+5%△ROE)	+10% △ROE	EVA (+10%△ROE)
1784.316	5.85%	4.37%	-26.30758	4.58%	-22.59390
1840.516	5.85%	7.44%	29.41792	7.80%	35.94162
1808.883	5.85%	5.74%	-1.94844	6.01%	2.99358
1788.297	5.85%	4.59%	-22.36060	4.81%	-18.44789
1817.181	5.85%	6.19%	6.27930	6.49%	11.63621
1789.638	5.85%	4.67%	-21.03006	4.89%	-17.05026
1776.069	5.85%	3.90%	-34.48438	4.09%	-31.18302
1798.974	5.85%	5.19%	-11.77334	5.44%	-7.32676
1756.015	5.85%	2.75%	-54.36918	2.88%	-52.07054
1780.443	5.85%	4.15%	-30.14800	4.35%	-26.62798
1812.675	5.85%	5.95%	1.81213	6.23%	6.94378
1793.29	5.85%	4.87%	-17.40921	5.11%	-13.24682
1804.667	5.85%	5.51%	-6.12827	5.77%	-1.39703
1825.844	5.85%	6.66%	14.86988	6.98%	20.65998
1829.819	5.85%	6.87%	18.81071	7.20%	24.79953
1808.916	5.85%	5.74%	-1.91510	6.01%	3.02859
1859.116	5.85%	8.42%	47.86040	8.82%	55.31408

Annex 9: Part of the scenarios of sensitivity when changing Re

Total Equity	ROE	-10% △Re	EVA (-10%△Re)	-5% △Re	EVA (-5%△Re)
1784.316	4.16%	5.26%	-19.591774	5.55%	-24.806515
1840.516	7.09%	5.26%	33.6521992	5.55%	28.2732101
1808.883	5.46%	5.26%	3.68262289	5.55%	-1.6039154
1788.297	4.38%	5.26%	-15.820564	5.55%	-21.046938
1817.181	5.90%	5.26%	11.5439709	5.55%	6.23318171
1789.638	4.45%	5.26%	-14.549275	5.55%	-19.779572
1776.069	3.72%	5.26%	-27.40445	5.55%	-32.59509
1798.974	4.94%	5.26%	-5.7047658	5.55%	-10.962346
1756.015	2.62%	5.26%	-46.403757	5.55%	-51.535788
1780.443	3.95%	5.26%	-23.261181	5.55%	-28.464602
1812.675	5.66%	5.26%	7.27573069	5.55%	1.97810831
1793.29	4.64%	5.26%	-11.089658	5.55%	-16.330626
1804.667	5.24%	5.26%	-0.3110763	5.55%	-5.5852947
1825.844	6.34%	5.26%	19.7520015	5.55%	14.4158921
1829.819	6.55%	5.26%	23.5173432	5.55%	18.1696183
1808.916	5.47%	5.26%	3.71447304	5.55%	-1.5721635
1859.116	8.02%	5.26%	51.2734102	5.55%	45.8400628
Total Equity	ROE	+5% △Re	EVA (+5%△Re)	+10% △Re	EVA (+10%△Re)
1784.316	4.16%	6.14%	-35.235997	6.43%	-40.4507379
1840.516	7.09%	6.14%	17.51523182	6.43%	12.13624271
1808.883	5.46%	6.14%	-12.1769919	6.43%	-17.4635302
1788.297	4.38%	6.14%	-31.4996867	6.43%	-36.7260611
1817.181	5.90%	6.14%	-4.38839657	6.43%	-9.69918572
1789.638	4.45%	6.14%	-30.2401637	6.43%	-35.4704598
1776.069	3.72%	6.14%	-42.9763708	6.43%	-48.167011
1798.974	4.94%	6.14%	-21.4775054	6.43%	-26.7350852
1756.015	2.62%	6.14%	-61.7998494	6.43%	-66.9318801
1780.443	3.95%	6.14%	-38.8714448	6.43%	-44.0748662
1812.675	5.66%	6.14%	-8.61713644	6.43%	-13.9147588
1793.29	4.64%	6.14%	-26.812563	6.43%	-32.0535314
1804.667	5.24%	6.14%	-16.1337316	6.43%	-21.40795
1825.844	6.34%	6.14%	3.74367314	6.43%	-1.59243633
1829.819	6.55%	6.14%	7.474168536	6.43%	2.126443658
1808.916	5.47%	6.14%	-12.1454365	6.43%	-17.4320731
1859.116	8.02%	6.14%	34.97336793	6.43%	29.5400205

Annex 10: Part of the scenarios of sensitivity when changing Equity

ROE	Re	-10% △E	EVA (-10%△E)	-5% △E	EVA (-5%△E)
4.16%	5.85%	1605.884325	-27.019131	1695.100121	-28.520193
7.09%	5.85%	1656.464723	20.6047988	1748.490541	21.7495099
5.46%	5.85%	1627.994401	-6.2014083	1718.438534	-6.545931
4.38%	5.85%	1609.466878	-23.645981	1698.881705	-24.959647
5.90%	5.85%	1635.462478	0.83015331	1726.321505	0.87627294
4.45%	5.85%	1610.674569	-22.508881	1700.15649	-23.759374
3.72%	5.85%	1598.462485	-34.007158	1687.265957	-35.896444
4.94%	5.85%	1619.076624	-14.597933	1709.025326	-15.408929
2.62%	5.85%	1580.413635	-51.001037	1668.214393	-53.834428
3.95%	5.85%	1602.398485	-30.301221	1691.420623	-31.984622
5.66%	5.85%	1631.40776	-2.9875627	1722.041525	-3.1535384
4.64%	5.85%	1613.961116	-19.414435	1703.625623	-20.493015
5.24%	5.85%	1624.20049	-9.7735618	1714.43385	-10.316537
6.34%	5.85%	1643.259895	8.17180434	1734.552111	8.62579348
6.55%	5.85%	1646.836872	11.5397041	1738.327809	12.1807987
5.47%	5.85%	1628.024658	-6.17292	1718.470472	-6.51586
8.02%	5.85%	1673.204418	36.3660438	1766.160219	38.3863796
ROE	Re	+5% △E	EVA (+5%△E)	+10% △E	EVA (+10%△E)
4.16%	5.85%	1873.531713	-31.5223189	1962.747509	-33.0233818
7.09%	5.85%	1932.542177	24.03893198	2024.567995	25.18364303
5.46%	5.85%	1899.326801	-7.23497634	1989.770934	-7.57949903
4.38%	5.85%	1877.711358	-27.5869779	1967.126185	-28.9006436
5.90%	5.85%	1908.039558	0.968512198	1998.898584	1.014631826
4.45%	5.85%	1879.120331	-26.260361	1968.602251	-27.5108544
3.72%	5.85%	1864.8729	-39.6750172	1953.676371	-41.5643037
4.94%	5.85%	1888.922728	-17.0309218	1978.87143	-17.8419181
2.62%	5.85%	1843.815908	-59.5012097	1931.616665	-62.3346007
3.95%	5.85%	1869.464899	-35.3514245	1958.487037	-37.0348257
5.66%	5.85%	1903.309054	-3.48548977	1993.942818	-3.65146547
4.64%	5.85%	1882.954636	-22.6501744	1972.619142	-23.7287541
5.24%	5.85%	1894.900572	-11.4024888	1985.133932	-11.9454645
6.34%	5.85%	1917.136544	9.533771736	2008.42876	9.987760866
6.55%	5.85%	1921.309684	13.46298808	2012.800621	14.10408276
5.47%	5.85%	1899.362101	-7.20174002	1989.807915	-7.54468002
8.02%	5.85%	1952.071821	42.42705113	2045.027622	44.4473869