ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ

UNIVERSITY OF PIRAEUS

<u>Thesis Title</u>

Business Combinations: Impairment Testing and Purchase Price Allocation

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Dedicated to my father who has been next to me in every step of my academic path.

Special thanks

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Abstract

This thesis attempts to demonstrate a case study and more specifiacally EP.AL.ME S.A's acquisition by Mytilinaios Group. It also depicts how valuation methodology and practice effects greatly the financial statements of the Buyer company.

Through the case study, I will show the utilization of three valuation methods, the Discounted Cash Flows Method, the Capital Market Multiples Method and the Comparable Transactions Multiples Method.

I will explain what Purchase Price Allocation and Impairment Testing mean in the modern world of the Accounting and Financial Analysis.

Περίληψη

Η παρούσα διπλωματική εργασία επιχειρεί να καταδείξει αναλύοντας μια συγκεκριμένη περίπτωσης, από την εξαγορά της ΕΠ.ΑΛ.ΜΕ Α.Ε. από τον Όμιλο Μυτιληναίος, πώς η μεθοδολογία και οι πρακτικές αποτίμησης επηρεάζουν σε μεγάλο βαθμό τις οικονομικές καταστάσεις της Αγοράστριας εταιρείας.

Μέσα από αυτή την εξαγορά, θα δείξω τη χρήση τριών μεθόδων αποτίμησης, τη μέθοδο των προεξοφλημένων ταμειακών ροών, τη μέθοδο Capital Market Multiples και τη μέθοδο Comparable Transactions Multiples.

Θα εξηγήσω τι σημαίνει Purchase Price Allocation και Impairment στο σύγχρονο κόσμο της Λογιστικής και της Χρηματοοικονομική ανάλυσης.

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1.0 Introduction

This thesis is a combination of accounting knowledge, company valuation, microeconomics and macroeconomics.

Throught this paper, I intend to demonstrate that in order to be able to conduct a proper business valuation, all the above mentioned areas of knowledge are essential.

In an attempt to determine whether a recently acquired company was valued properly and to audit whether the Goodwill from the acquisition was transferred properly in the Buyer's Financial Statements, I will utilize three (3) valuation methods and conduct the Impairment Testing of the Goodwill.

The Valuation methods that I will demonstrate in the following chapters are:

- the Discounted Cash Flows Method
- the Capital Market Multiples Method and
- the Comparable Transactions Multiples Method

The case study is EP.AL.ME S.A's recent acquisition by Mytilinaios Group.

However, before moving on with the valuation of EP.AL.ME S.A I deemed necessary to briefly mention a few things about the International Financial Reporting Standards and the guidelines that they provide. A brief mention to the Intangible Assets and the Purchase Price Allocation methodology is also required, given that a company's Goodwill is created through the correct implementation of the Purchase Price Allocation process. I also, think that it is important to give a small theoretical background on Impairment Testing and Valuation Methodology in general, given that I understand that it is a very specific topic that is usually only reached in time periods with large activity in Mergers and Acquisitions.

The reason that I decided to write this thesis is because I believe that a real case study helps immensely, when a person interested in Mergers and Acquisitions desires to know more about Valuation Methodologies. This thesis combines knowledge and personal experience and I believe that it can become a guide for an introduction to Business Combinations.

2.0 Purchase Price Allocation

2.1 Introduction and Definitions

Business combination procedures can be very complex, when it comes to strategic and operational decisions; what is absolutely essential however, is to overcome all the accounting related challenges. For that purpose, the International Financial Reporting Standards (IFRS) provide comprehensive guidelines.

An integrated part of the acquisition process is the Purchase Price Allocation (PPA) process as the value of the newly identified assets has a direct impact on the resulting Goodwill. In more detail, PPA is utilized to identify the value of the intangible assets of the acquired company and adjust the Fair value of the company. The value that will derive from the difference between the company's adjusted fair value and the purchase price will constitute the Goodwill transferred to the Buyer-company's Balance Sheet.

It should be mentioned that for the purpose of this thesis and in accordance with International Financial Reporting Standard 13 – Fair Value Measurement (IFRS 13), the term "fair value" is defined as: *"The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date"* (Board 2010). The fair value, therefore, would be a reasonable estimate of the price upon which an individual asset or the entire equity stake in a company would change ownership.

2.2 Intangible Assets Identification Process

IFRS 3 requires the consideration transferred in a business combination to be measured at fair value. This is calculated as the sum of the fair values of the assets transferred by the acquirer, the liabilities incurred by the acquirer to former owners of the acquire and the equity interests issued by the acquirer. The acquirer must recognize, separately from goodwill, the identifiable assets acquired, the liabilities assumed and any non-controlling interest in the acquire or target company. The identifiable assets acquired may also include intangible assets.

Intangible assets are non-monetary assets, without physical substance, which are however identifiable. According to International Accounting Standard 38 - Intangible Assets (IAS 38) (Board 2010), an intangible asset meets the identification criterion, only if it is separable - meaning that it is capable of being separated or divided from the entity and

sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, asset or liability - or if it arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations. Furthermore, the International Glossary of Business Valuation Terms defines intangible assets as "non-physical assets such as franchises, trademarks, patents, copyrights, goodwill, equities, mineral rights, securities and contracts (as distinguished from physical assets) that grant rights and privileges and have value for the owner." According to Valuation of Intellectual Property and Intangible Assets by Smith & Parr (Smith 2000), intangible assets can also be defined as "all the elements of a business enterprise that exist in addition to monetary and tangible assets." Intangible assets do not have physical substance, and often, there is significant uncertainty related to the amount and timing of their estimated future benefits.

Usually, intangible assets include customer relationships, customer lists, trademarks, logos, copyrights, licenses (for example a license to produce and sell a pharmaceutical product), non–compete agreements, patents, internally developed computer software and other. The following table presents the various valuation methods that apply to different types of intangible assets (Schweihs 1998).

Types of Intangible Assets and Valuation Methods

Intangible asset	Commonly utilized valuation method
Developed technology	Relief from royalty
	Multi-period excess earnings
Patents	Relief from royalty
	Multi-period excess earnings
	Comparable sales or licensing transactions
Trademarks	Relief from royalty
	Multi-period excess earnings
Brands	Multi-period excess earnings
	Relief from royalty
Customer relationships	Multi-period excess earnings

	Multi-period excess earnings
In-process research and development ("IPR&D")	Relief from royalty
	Decision Tree Analysis
	Split Methods
Non-compete agreements	With-and-without
	Incremental Income
Favorable contracts	Replacement cost
	Differential Method
Concession contracts	Multi-period excess earnings
Assembled workforce	Replacement cost

Lastly, provided that an item meets the definition criteria of an intangible asset, it should be recognized in the financial statements if, and only if it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity, and the cost of the asset can be measured reliably.

3.0 Impairment Testing for Goodwill

3.1 Introduction and Definitions

As mentioned in the previous section, goodwill is the residual amount that derives after the Purchases Price Allocation process. International Accounting Standard 36 states that an asset is impaired when its carrying amount exceeds its recoverable amount. The carrying amount is defined as the amount at which an asset is recognized in the balance sheet after deducting accumulated depreciation and accumulated impairment losses. At the end of each reporting date, entities shall assess whether there is any indication that an asset may be impaired. If any such indication exists, the entity shall assess the recoverable amount of the asset. Goodwill acquired after a business combination is required to be tested for impairment at least annually, irrespective of whether there is any indication of impairment.

The recoverable amount of an asset is the greater of its "Fair Value Less Cost to Sell" and its "Value in Use". Fair value less costs to sell (FVLCS) is the amount obtainable from the sale of the asset in an arm's length transaction between knowledgeable and willing parties, less the costs of disposal. While "Value in Use" (VIU) is the present value of the future cash flows expected to be derived from an asset.

In order to determine whether goodwill acquired after a business combination needs to be impaired, the Fair Value of the company that was acquired needs to be calculated on an "as is", "stand-alone" basis. Meaning the valuation of the target company needs to be conducted under the premise that the company continues to operate as an independent company in the fields that it used to operate before the acquisition and on a going-concern basis.

3.2 Generally Accepted Valuation Methods

There are many different techniques and formulas for determining the value of a business as a going concern and there are certain rules of thumb that apply to particular industries or types of business. While these industry rules of thumb provide a quick estimate of the value of a business, they do not provide adequate analytical support and evidential matter to withstand administrative or judicial scrutiny.

For the most part, all valuation techniques can be categorized into three approaches (Income, Market and Cost). For the purposes of this thesis, three out of the five valuation approaches were utilized and therefore a brief introduction to these approaches is deemed appropriate. The table below presents the most common valuation methodologies of each approach (Mr. Jay Fishman 2006) and the approaches utilized in the present document.

Approach	Valuation Methodologies	Used
Income Approach	Discounted Cash Flows Method	Yes
Market Approach	Capital Market Multiples Method	Yes
	Comparable Transactions Multiples Method	Yes
	Stock Market Capitalization	No
Cost Approach	Adjusted Net Book Value Method	No

3.2.1. The Discounted Cash Flows Method

The Discounted Cash Flows method (DCF) is based on the premise that the value of the business enterprise is the present value of the future economic income to be derived by the owner of the business. The discounted net cash flows method requires an analysis of revenue and expense, an investment analysis, a capital structure analysis, as well as a terminal value analysis.

Based on the results of the above-mentioned analyses, a forecast of free cash flows from business operations is made for a reasonable explicit forecast period. The cash flows forecast is discounted at an appropriate discount rate, to determine the present value. The terminal (residual) value of the business enterprise is determined at the end of the explicit forecast period. This terminal (residual) value is also discounted to determine the present value.

The present value of the explicit net cash flows forecast is summed to the present value of the residual value. This summation represents the value of the business enterprise. Since the future cash flows are those relating to the normal business operations, (and thus the business assets used in generating those cash flows) the value of any "non-operating" assets and the fair market value of any subsidiary must be added to the value derived under the cash flows method to arrive at the final conclusion of value.

3.2.2. Capital Market Multiples Method

The Capital Market Multiples method (CMM) is based on the premise that the value of the business enterprise should be determined based on what rational capital market investors would pay to own the stock in the subject company. Using this method, the first step is to select a sample of firms that are comparable to the subject firm or unit and whose shares are publicly traded on international stock markets. Selecting the appropriate sample of comparable firms, based on reasonable comparability criteria is essential for this valuation method.

For each firm in the sample of publicly traded firms, several capital market ratios are calculated. Indicatively the price/earnings ratio, the price/revenue ratio, the price/cash flow ratio are common capital market ratios. After these capital market ratios are calculated for each firm in the sample, an appropriate ratio value or "multiple" is selected. This multiple is then applied to the appropriate financial data of the subject business deriving to a preliminary estimate of the fair market value of the business enterprise. This

preliminary estimate must be adjusted for any lack of comparability of the subject firm to the publicly traded firms in the capital market sample. These adjustments may include a minority interest or a marketability discount as well as a majority control premium e.tc.

3.2.3. Comparable Transactions Multiples Method

The Comparable Transactions method (CT) determines the value of the business enterprise by comparing the subject firm to comparable firms that have been bought or sold during a reasonably recent period of time. The first step in this method is to determine a sample of comparable firms that have been bought or sold in the recent past. The correct selection of the sample is critical to this method, and the criteria for comparability may vary.

As in the previously described method, several transaction multiples are calculated. The result of utilizing these transaction multiples is the preliminary estimate of the fair market value of the business enterprise or unit. This preliminary estimate may be adjusted for the lack of comparability of the subject firm to the various firms included in the sample of comparable firms.

4.0 Impairment Testing Case Study

4.1 The Acquisition of EP.AL.ME S.A by Mytilineos Group

A company's goodwill valuation requires adequate analytical support and evidential matter to withstand administrative or judicial scrutiny. In this thesis, I intend to provide the support relative to the recognition of goodwill following the acquisition of EP.AL.ME S.A. by Mytilineos Holdings S.A.

On October 23, 2018 Mytilineos Holdings S.A. agreed to acquire a 97.87% stake in EP-AL-ME S.A. for € 20 million. EP-AL-ME S.A. was active in the industrial production, processing and marketing of metals, especially aluminium alloys and their products. It was the largest independent producer of recycled (secondary) aluminium in Greece. The acquisition price was inclusive of debt and it will substantially strengthen Mytilineos' metallurgy business unit. From the acquisition Mytilineos recognized a goodwill amount of approximately € 15.5 million. According to International Accounting Standard 36 the goodwill amount must be tested for impairment on a yearly basis.

This thesis commenced in January 2020 thusly, the final financial data of Mytilineos Holdings S.A. were not available when the thesis was being written.

The purpose of the thesis is to evaluate whether the Goodwill presented in Mytilineos Holdings S.A.'s 2019 final financial statements, is depicted correctly. In other words, the thesis investigates if the Purchase Price Allocation was conducted properly, after EP-AL-ME S.A.'s acquisition by Mytilineos Holdings S.A. and if a correction in the Goodwill presented in the Balance Sheet of Mytilineos Holdings S.A. as of 31.12.2019, is required, after Impairment Testing.

In order to conclude on the above mentioned questions the Discounted Cash Flows method was used to determine the "Value in Use" and the Capital Market Multiples method and Comparable Transactions method were used to determine the "Fair Value Less Cost to Sell" of EP-AL-ME S.A. as of 31.12.2018.

4.2 EP.AL.ME S.A. Valuation - Discounted Cash Flows method

For the valuation of EP.AL.ME I utilized the Free Cash Flow to the Firm approach. Free Cash Flows are defined as Earnings before Interest & Tax (EBIT) minus Taxes, Change

in Working Capital Requirements and Capital Expenditure Requirements, plus Non-cash items.

Using EP.AL.ME's latest financial statements, previous to the acquisition, vis a vis the financial statements for fiscal years 2017 and 2018 I was able to project the company's financials for a 5-year period.

4.2.1. Company Financials Projections

In order to project the financial statements for EP.AL.ME of a 5-year period, I proceeded to the following calculations and assumptions:

a. I projected the company's fixed assets by calculating the depreciation of its assets for the period in scope. Furthermore, I included investments related to Capital Expenditure for the company's manufacturing plant as well as for other equipment. The table below presents the calculations for the projected assets' balance sheet amounts based on a depreciation analysis.

Assets Depreciation Analysis

	2018A	2019P	2020P	2021P	2022P	2023P
Intangible Assets						
Acquisition Value	281	281	281	281	281	281
Capex		-	-	-	-	-
Depreciation [Existing Assets]		5	-	-	-	-
Depreciation [Capex]		-	-	-	-	-
Accumulated Depreciation	277	281	281	281	281	281
Net Book Value	**5**	**-**	**-**	**-**	**-**	**-**
Tangible Fixed Assets						
Land	**1.353**	**1.353**	**1.353**	**1.353**	**1.353**	**1.353**

Buildings

Acquisition Value	3.239	3.239	3.239	3.239	3.239	3.239
Capex		-	-	-	-	-
Depreciation [Existing Assets]		35	35	35	35	35
Depreciation [Capex]		-	-	-	-	-
Accumulated Depreciation	3.044	3.079	3.114	3.148	3.183	3.218
Net Book Value	**195**	**160**	**126**	**91**	**56**	**22**

Manufacturing Plant and Equipment

Acquisition Value	10.857	10.857	11.357	11.457	11.557	11.657
Capex	-	500	100	100	100	100
Depreciation [Existing Assets]		148	148	148	148	148
Depreciation [Capex]		7	8	10	11	12
Accumulated Depreciation	9.497	9.651	9.807	9.964	10.123	10.282
Net Book Value	**1.360**	**1.706**	**1.650**	**1.593**	**1.534**	**1.475**

Other Plant and Equipment

Acquisition Value	986	986	1.086	1.136	1.186	1.236
Capex	-	100	50	50	50	50
Depreciation [Existing Assets]		35	35	35	35	35
Depreciation [Capex]		4	5	7	9	11
Accumulated Depreciation	770	808	849	891	935	981
Net Book Value	**216**	**278**	**287**	**295**	**301**	**305**

Total Fixed (Tangible) Assets	**3.125**	**3.497**	**3.416**	**3.332**	**3.244**	**3.154**
Total Current Year Depreciation		232	231	234	237	241
Total Capex		600	150	150	150	150

Note: Amounts are presented in € thousands, A: Actual , P: Projected

b. I calculated the current assets for the 5-year projected period by assuming that the Inventory, the Receivables and the Trade Payables days will remain relatively the same as in previous years and with the use of the projected revenues. The following table presents the Assets amounts, for the projected period, in relevance to the actual amounts.

Balance Sheet

	2017A	2018A	2019P	2020P	2021P	2022P	2023P
ASSETS							
A. Fixed Assets							
Property, Plant & Equipment	2.754	3.125	3.497	3.416	3.332	3.244	3.154
% of Total Fixed Assets	*98,8%*	*86,0%*	*87,3%*	*87,1%*	*86,8%*	*86,5%*	*86,1%*
Other Non-current Assets	32	508	508	508	508	508	508
% of Total Fixed Assets	*1,2%*	*14,0%*	*12,7%*	*12,9%*	*13,2%*	*13,5%*	*13,9%*
Total Fixed Assets	**2.786**	**3.632**	**4.005**	**3.923**	**3.839**	**3.752**	**3.661**
% of Total Assets	*14,1%*	*15,9%*	*13,1%*	*11,8%*	*10,5%*	*9,5%*	*8,7%*
B. Current Assets							
Inventory	4.501	7.328	3.105	3.436	3.725	3.892	3.968
Inventory Days	*42 days*	*62 days*	*40 days*	*40 days*	*40 days*	*40 days*	*40 days*
Trade Receivables	8.782	9.695	8.767	9.810	10.585	11.015	11.194

Receivables Days	*75 days*	*75 days*	*80 days*	*80 days*	*80 days*	*80 days*	*80 days*
Other Receivables	115	128	128	128	128	128	128
Receivables Days	*1 days*	*1 days*	*1 days*	*1 days*	*1 days*	*1 days*	*1 days*
Prepayments	207	203	203	203	203	203	203
Cash & Cash Equivalents	3.403	1.847	14.284	15.778	17.918	20.319	23.162
% of Total Assets	*17,2%*	*8,1%*	*46,8%*	*47,4%*	*49,2%*	*51,7%*	*54,7%*
Total Current Assets	**17.008**	**19.202**	**26.487**	**29.356**	**32.559**	**35.557**	**38.656**
% of Total Assets	*85,9%*	*84,1%*	*86,9%*	*88,2%*	*89,5%*	*90,5%*	*91,3%*
TOTAL ASSETS	**19.794**	**22.835**	**30.491**	**33.279**	**36.398**	**39.309**	**42.317**
% change		*15,4%*	*33,5%*	*9,1%*	*9,4%*	*8,0%*	*7,7%*

Note: Amounts are presented in € thousands, A: Actual , P: Projected

c. Share capital and Liabilities remained relatively unchanged over the period in scope. Changes are related to loan repayments assuming a stable repayment deriving from previous financial statement analysis. The following table presents Equity and Liability amounts, for the projected period, in relevance to the actual amounts.

Balance Sheet

	2017A	2018A	2019P	2020P	2021P	2022P	2023P
SHAREHOLDERS' EQUITY & LIABILITIES							
A. Shareholders' Equity							
Paid-in Share Capital	4.178,9	4.178,9	4.178,9	4.178,9	4.178,9	4.178,9	4.178,9
Retained Earnings (Losses)	(377)	376	1.852	4.405	7.384	10.430	13.276
Total Shareholders' Equity	**3.802**	**4.555**	**6.031**	**8.584**	**11.563**	**14.609**	**17.455**
% of Total Shareholders' Equity & Liabilities	*19,2%*	*19,9%*	*19,8%*	*25,8%*	*31,8%*	*37,2%*	*41,2%*

B. Liabilities

Long-term Liabilities

Long-term Bank Liabilities	-	-	-	-	-	-	-
Long-Term Loans	1.769	4.840	4.840	4.840	4.840	4.840	4.840
Other Long-term Financial Liabilities	106	103	93	82	72	62	51
Total Long-term Liabilities	**1.875**	**4.943**	**4.933**	**4.922**	**4.912**	**4.902**	**4.892**
% of Total Shareholders' Equity & Liabilities	*9,5%*	*21,6%*	*16,2%*	*14,8%*	*13,5%*	*12,5%*	*11,6%*

Short-term Liabilities

Short-term Bank Liabilities	-	-	-	-	-	-	-
Short-Term Loans	9.772	9.417	10.917	10.417	9.917	9.417	9.417
Trade Payables	2.464	2.295	6.985	7.731	8.381	8.756	8.929
Days Payable	*23 days*	*19 days*	*90 days*	*90 days*	*90 days*	*90 days*	*90 days*
Accrued Liabilities	393	393	393	393	393	393	393
Other Short-term Liabilities	1.488	1.232	1.232	1.232	1.232	1.232	1.232
Total Short-term Liabilities	**14.117**	**13.337**	**19.527**	**19.773**	**19.923**	**19.798**	**19.971**
% of Total Shareholders' Equity & Liabilities	*71,3%*	*58,4%*	*64,0%*	*59,4%*	*54,7%*	*50,4%*	*47,2%*

Total Liabilities (I+II)	**15.992**	**18.280**	**24.460**	**24.695**	**24.835**	**24.700**	**24.862**
% of Total Shareholders' Equity & Liabilities	*80,8%*	*80,1%*	*80,2%*	*74,2%*	*68,2%*	*62,8%*	*58,8%*

TOTAL SHAREHOLDERS' EQUITY & LIABILITIES	**19.794**	**22.835**	**30.491**	**33.279**	**36.398**	**39.309**	**42.317**
% change		*15,4%*	*33,5%*	*9,1%*	*9,4%*	*8,0%*	*7,7%*

Note: Amounts are presented in € thousands, A: Actual , P: Projected

d. I calculated the projected revenues based on projections by Mytilineos Group on aluminium sales and prices as well as based on an analysis by "The Economist Intelligence Unit" (Unit 2021). The change in revenue varied between 20% and 2% regarding the projections from Mytilineos Group and between 2% to 1% regarding the projections from the Economist Intelligence Unit. Cost of Sales as well as all other expenses were calculated on assumptions relevant to the synergies that were formed after the company acquisition. The table below presents the income statement for the period in scope.

Income Statement

	2017A	2018A	2019P	2020P	2021P	2022P	2023P
Sales	**42.991**	**47.186**	**40.000**	**44.760**	**48.295**	**50.257**	**51.073**
% change	-	-	*(15,2%)*	*11,9%*	*7,9%*	*4,1%*	*1,6%*
[-] Cost of Sales	38.930	43.021	28.330	31.353	33.988	35.511	36.211
% of Sales	*90,6%*	*91,2%*	*70,8%*	*70,0%*	*70,4%*	*70,7%*	*70,9%*
Gross Profit	**4.061**	**4.165**	**11.670**	**13.407**	**14.307**	**14.746**	**14.861**
% of Sales	*9,4%*	*8,8%*	*29,2%*	*30,0%*	*29,6%*	*29,3%*	*29,1%*
[+] Other Operating Revenues	105	119	-	-	-	-	-
% of Sales	*0,2%*	*0,3%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*

[-] Administrative Expenses	1.681	1.465	2.400	2.484	2.571	2.661	2.754
% of Sales	*3,9%*	*3,1%*	*6,0%*	*5,5%*	*5,3%*	*5,3%*	*5,4%*
[-] Selling & Distribution Expenses	88	117	3.200	3.344	3.494	3.652	3.816
% of Sales	*0,2%*	*0,2%*	*8,0%*	*7,5%*	*7,2%*	*7,3%*	*7,5%*
[-] Other Expenses	490	665	3.600	3.708	3.819	3.934	4.052
% of Sales	*1,1%*	*1,4%*	*9,0%*	*8,3%*	*7,9%*	*7,8%*	*7,9%*
EBITDA	**1.907**	**2.036**	**2.470**	**3.871**	**4.422**	**4.499**	**4.239**
% of Sales	*4,4%*	*4,3%*	*6,2%*	*8,6%*	*9,2%*	*9,0%*	*8,3%*
[-] Depreciation & Amortization (to be incorporated in Operational Cost)			232	231	234	237	241
EBIT	**1.907**	**2.036**	**2.238**	**3.640**	**4.188**	**4.262**	**3.999**
% of Sales	*4,4%*	*4,3%*	*5,6%*	*8,1%*	*8,7%*	*8,5%*	*7,8%*
[+] Financial Revenue	1	1	-	-	-	-	-
[-] Financial Expenses	647	670	295	281	268	254	254
EBT	**1.261**	**1.367**	**1.943**	**3.359**	**3.920**	**4.008**	**3.745**
% of Sales	*2,9%*	*2,9%*	*4,9%*	*7,5%*	*8,1%*	*8,0%*	*7,3%*
[-] Income Tax	584	614	466	806	941	962	899
% effective income tax	*46,3%*	*44,9%*	*24,0%*	*24,0%*	*24,0%*	*24,0%*	*24,0%*

[-] Deferred Taxes	-	-	-	-	-	-	-
EAT	**677**	**752**	**1.477**	**2.553**	**2.980**	**3.046**	**2.846**
% of Sales	*1,6%*	*1,6%*	*3,7%*	*5,7%*	*6,2%*	*6,1%*	*5,6%*

Notes: Amounts are presented in € thousands, A: Actual , P: Projected
EBITDA: Earnings Before Interest, Tax, Depreciation & Amortisation
EBIT: Earnings Before Interest and Tax
EBT: Earnings Before Tax
EAT: Earnings After Tax

As mentioned in the beginning of this chapter, Free Cash Flows are defined as Earnings before Interest & Tax (EBIT) minus Taxes, Change in Working Capital Requirements and Capital Expenditure Requirements, plus Non-cash items. The following table presents the Free Cash Flow to the Firm for EP.AL.ME.

Free Cash Flows to the Firm

	2017A	2018A	2019P	2020P	2021P	2022P	2023P
EBIT			2.238	3.640	4.188	4.262	3.999
Less: Notional Taxes on EBIT			537	874	1.005	1.023	960
EBIT Less Notional Taxes			**1.701**	**2.766**	**3.183**	**3.239**	**3.039**
Working Capital	9.260	13.435	3.593	4.222	4.636	4.857	4.940
[+] Depreciation included in Operational Cost			232	231	234	237	241
[-] Capital Expenditure			600	150	150	150	150

[-] Change in Working Capital	(9.843)	629	414	221	83
Free Cash Flow to Firm	**11.176**	**2.218**	**2.853**	**3.105**	**3.047**

Once the Free Cash Flows to the Firm are calculated the Value in Use of the Company is derived by discounting the Free Cash Flows to the Firm for a period of time, using the appropriate discount rate and adding the discounted Terminal Value of the Company. In this case study the Weighted Average Cost of Capital (WACC) is used as the discount rate. The following section analyses the methodology used to calculate WACC.

4.2.2. Calculation of the Weighted Average Cost of Capital

A discount rate is a rate of return used to convert a future monetary sum into present value. It is the return required by an investor to make a particular investment. A discount rate is a forward-looking rate representing an adequate return for the period during which the investment is held. The discount rate needs to consider the time value of money, inflation, and the risk inherent in ownership of the asset being valued. The Weighted Average Cost of Capital is a discount rate widely used in corporate finance. The WACC is based on the general level of interest rates, plus premiums for general market, business and financial risks. The discount rate derived incorporates the level of risk in achieving the amount of revenue and resultant profitability inherent in the Buyer's projections (Fernandez 2009). The WACC can be calculated by using the following equation.

$$WACC = \left(\left(\frac{E}{D+E}\right) * Ke\right) + \left(\left(\frac{D}{D+E}\right) * Kdt\right)$$

Where:

E: Equity

D: Debt

Ke: Cost of Equity

Kdt: Cost of Debt after tax

The most common method to calculate the Cost of Equity is through the Capital Asset Pricing Model.

4.2.3. Cost of Equity and The Capital Asset Pricing Model

The capital asset pricing model (CAPM) was originally developed by Nobel-prize winning economist William F. Sharpe in 1964. The model was developed in the context of portfolio theory as a means of measuring the risk that an individual stock contributes to a well-diversified portfolio. The original model was not intended to derive the cost of equity for an individual stock, but it has been adapted for this purpose through some modifications. Small stock and company-specific risk premiums are additional considerations in developing discount rates, however the application depends on the facts and circumstances of the company.

In relevance to the previous section the cost of Equity can be calculated using the following Capital Asset Pricing Model formula.

$$Ke = Rf + \beta * (Rm - Rf) + Ks$$

Where:

Ke = Cost of Equity. In the case study that I am analyzing, that is the acquisition of EP.AL.ME by Mytilineos Holdings S.A, cost of equity represents the return that Mytilineos Holdings S.A requires to decide whether the acquisition meets capital return requirements.

Rf = The risk-free interest rate, is the expected return of a risk-free investment. In other words, is the rate of return available in the market on an investment free of default risk. (American Institute of Certified Public Accountants n.d.) In this case study the risk-free rate is represented by an average return of the 10-year Greek Government Bond (see Appendix A.)

Rm – Rf = The equity risk premium (ERP) is the difference between the return expected from an investment in an equity portfolio having the same composition as the market portfolio (Rm) and the risk-free rate (Rf). The equity risk premium for this case study was estimated based on the data available by Professor Aswath Damodaran, on January 2020. Based on Greece's Country Risk Premium (2,10%), considering the B1 rating given by Moody's to the country, and the risk premium for a mature equity market (5,20%). Taking the aforementioned into account, Professor Damodaran derived in an equity risk premium of 7,30%. (Appendix B)

β = The factor "beta" (β), captures the systematic risk that remains constant and therefore expresses the estimated dependency of the returns of a company's shares and the returns of the market portfolio (Damodaran 2006,2nd ed). In a following section I will try to depict and describe, in detail, how the beta was calculated for the purposes of EP.AL.ME's valuation.

Ks = Small stock premium or Company size premium, was implemented for the calculation of the Weighted Average Cost of Capital. Based on historic data, smaller companies in the U.S. stock markets average higher rates of return than larger companies. To compensate investors for taking up that additional risk, a premium was added to the calculation of the WACC. This company size premium is based on the size premium study published in the Duff & Phelps Valuation Handbook – guide to cost of capital. For the valuation of EP.AL.ME the size premium of the micro-cap (9-10) decile ranges was utilized (Duff & Phelp 2019) and thus a premium of 6% was implemented.

The following table depicts the calculation of the Cost of Equity, based on the capital asset pricing model, for EP.AL.ME's valuation purposes.

Cost of Equity

Risk Free Rate (10-year Greek Bond yield)	2,2%
Equity Risk Premium	7,3%
Beta	0,7
Small Size Premium	6,0%
Cost of Equity	**13,1%**

4.2.4. Cost of Debt

The next step in identifying the appropriate discount rate, in this case the WACC, is to calculate the Cost of Debt. Each company's cost of debt relies on numerous factors such as the company's capital structure, its payment history, the types of credits received and various other credit quality factors.

Regarding EP.AL.ME, the data relevant to the debt that the company held were insufficient in determining the company's cost of debt. Having that in mind, the preferable way of continuing the valuation, was to determine the cost of debt based on publicly available data. The monthly report, of the Bank of Greece, on regular loans, with

collateral, to non-financial corporations indicated that cost of debt, before tax, for a company, at the size of EP.AL.ME, is approximately 4%.

To incorporate cost of debt to the formula calculating the weighted average cost of capital, cost of debt needs to be adjusted based on the country's tax rate. The following formula represents the adjustment.

$$Cost\ of\ Debt\ (after\ tax) = Cost\ of\ Debt\ (pre\ tax) * (1 - tax\ rate)$$

Based on L. 4646/2019, the corporate tax rate in Greece, for the fiscal years of 2019 and so forth, is established to 24%.

The following table presents the calculation of after-tax cost of debt for EP.AL.ME's valuation purposes.

After-tax Cost of Debt

Cost of Debt (pre-tax)	4,0%
Corporate Tax Rate	24,0%
Cost of Debt (after-tax)	**3,0%**

4.2.5. Optimal Capital Structure

After having identified the Cost of Equity and the Cost of Debt, the last step in calculating the weighted average cost of capital is to find the Optimal Capital Structure for the company under evaluation. For that purpose, I gathered information on companies that are trading in a public market and which present characteristics that are similar to those of EP.AL.ME.

I took into account factors such as the industry that the sample companies are operating in, the location of the companies, the products and services that the sample companies produce as well as the size of the companies. Specifically, for the identification of the optimal capital structure for EP.AL.ME. I used a sample that is consisted of 18 companies operating in the industry of aluminum production. All 18 companies are based in Europe and are similar in size with EP.AL.ME.

The following paragraphs will provide a brief description for each company included in the sample because understanding how comparable the companies of the sample are to EP.AL.ME. is essential.

- Alcomet AD produces and sells castings, and rolled and extruded aluminum products in Bulgaria. The company offers household, container, converter, insulation, and technical foils; coils and billets; and standard strips and sheets, strips for heat shields, finstock products, strips for noise protection panels, and omnia sheets. It also provides standard and customized profiles. The company's products are used in building and architecture, automotive, transportation, distribution, packaging, machine building, food, and other industries. It also exports its products primarily to rest of Europe and the United States of America. The company was founded in 1981 and is headquartered in Shumen, Bulgaria. Alcomet AD is a subsidiary of Alumetal AD.

- Alro S.A., together with its subsidiaries, produces and sells aluminum in Romania, the other European Union countries, other non-European Union countries, the United States, and internationally. It operates through four segments: Bauxite, Alumina, Primary Aluminium, and Processed Aluminium. The company offers alumina for aluminum smelting; and primary aluminum products, including wires rods, slabs, billets, and ingots. It also provides processed aluminum products, such as hot rolled coils that are used as raw materials for the cold rolling mill; corrugated, heat treated, and embossed sheets; heat treated and non-heat treated plates; standard and customer profiles; and extruded products. In addition, it mines and markets bauxite. The company was founded in 1961 and is headquartered in Slatina, Romania. Alro S.A. is a subsidiary of Vimetco N.V.

- Alumetal S.A., together with its subsidiaries, manufactures and sells secondary aluminum casting alloys for the automotive market sector in Poland, Germany, and other European countries. It offers aluminum casting alloys in the form of one-notch ingots, two-notch ingots, and waffle plates, as well as liquid metal; fluxes and salts; and by-products, including metal wastes. The company was founded in 1953 and is headquartered in Kety, Poland.

- Alumil Aluminium Industry S.A., together with its subsidiaries, designs, produces, and distributes a range of architectural aluminium systems in Greece and internationally. The company offers windows and doors, sliding doors, entrance doors, folding doors, railing and fences, curtain walls, partitions, wall cladding systems, and conservatories, as well as shading, safety, and security systems for doors and windows. It also provides building materials comprising polycarbonate sheets and wood-plastic composites for various applications, such as atriums, skylights, decking, fencing, cladding, and others; and various aluminum systems for atriums, glass roofs, skylights, and greenhouses. In addition, the company offers surface treatments, such as anodizing, powder coating, preanodizing, and sublimation; and accessories, including window and

door locks, hinges, handles, and other hardware. Further, it provides various PV mounting structures; and automation systems. The company was founded in 1988 and is headquartered in Kilkis, Greece.

- Alumil Rom Industry S.A. produces and sells aluminum profiles and accessories in Romania and internationally. It offers hinged window and door, sliding door, shutter and rolling shutter, bi-folding door, curtain wall and façade, office partition, solar shading, cladding, atrium and conservatory, railing, pergola, decking, building integrated photovoltaics (BIPV), and photovoltaic mounting systems, as well as special system, which includes systems for interior partitioning, sun protection, skylights, and systems for protection against insects, pergola systems with and without break. The company provides noise barrier entrance, fire resistant and heavy duty doors; customized fenestration; polycarbonate sheets; elevators; and surface treatment. In addition, it offers aluminum profiles, accessories for aluminum profiles, outdoor aluminum systems, such as fences, railings, pergolas, J-bond / outdoor decorative panels, polycarbonates, and WPC composite material. Further, the company provides roto-tipping minimalist system, folding doors system, electrically operated sliding system, and system to access doors with security, tightness, and thermic insulation. The company was founded in 1997 and is headquartered in Bucharest, Romania. Alumil Rom Industry S.A. is a subsidiary of Alumil Aluminium Industry S.A.

- AMAG Austria Metall AG, together with its subsidiaries, produces, processes, and distributes aluminum, and aluminum wrought and cast products in Austria, Western Europe, rest of Europe, North America, Asia, Oceania, and internationally. It operates through Metal, Casting, Rolling, and Service divisions. The Metal division produces and markets primary aluminum, and manages metal production streams. The Casting division produces cast aluminum alloys from aluminum scrap for use by various sectors, including the automotive sector and supply industry, as well as the engineering and electrical engineering sectors. Its product portfolio covers materials tailored to customer requirements in the form of ingots, sows, and liquid aluminum. The Rolling division manufactures rolled aluminum products, such as sheets, strips, and plates for applications in the automotive and aviation, as well as in the sports, engineering, transportation, and other industrial sectors. It also specializes in bright products, customized cathode elements for zinc smelters, brazing materials, tread plate, and high strength alloys, as well as foil stock for the packaging industry. The Service division provides facility management, energy supply, waste disposal, general site, and materials management services. AMAG Austria Metall AG is headquartered in Ranshofen, Austria.

- Biokarpet S.A. engages in the metallurgy, textile, and information technology sectors in Greece, rest of European union, and internationally. The company produces and trades in handmade and machine-made carpets, moquettes, blankets,

flokati rugs, and other products for flooring and home decoration. It also offers upholstery fabrics, curtains, throws, straw mats, decorative species, and furniture; linen and wall coverings for bed and bath; wall to wall carpets and carpet tiles; indoor and outdoor wooden floors; and linens and wallpapers, as well as carpet cleaning and storage services. In addition, it designs, produces, and trades in aluminum-extruded products for construction and industrial uses; aluminum frames, shop windows, blowers, glass panes, interior partitions, etc.; and modulated aluminum and steel sheets. Further, the company designs and develops tailor-made integral information systems for enterprises and organizations. Additionally, it produces and distributes electricity through renewable sources. The company operates stores in Greece, Romania, Bulgaria, Cyprus, Poland, and Albania, as well as offers its products online. It also exports its products. Biokarpet S.A. was founded in 1950 and is headquartered in Athens, Greece.

- Coil S.A./N.V. provides anodizing services on aluminum flat rolled products in coil form in Europe. The company's products are used in various applications, which include architectural, public works, welded tubes, automotive, consumer goods, medical, aerospace, and signage. It serves customers through a network of distributors. The company was founded in 1972 and is headquartered in Landen, Belgium.

- Constellium SE, together with its subsidiaries, engages in the design, manufacture, and sale of specialty rolled and extruded aluminum products for the packaging, aerospace, and automotive end-markets. The company operates through three segments: Packaging & Automotive Rolled Products, Aerospace & Transportation, and Automotive Structures & Industry. The Packaging & Automotive Rolled Products segment produces rolled aluminum products, including can stock and closure stock for the beverage and food industry, as well as foil stock for the flexible packaging market. It also supplies automotive body sheets and heat exchangers for the automotive market; and specialty reflective sheets. The Aerospace & Transportation segment provides rolled aluminum products, including aerospace plates, sheets, and extrusions; and aerospace wing skins, as well as plates and sheets for use in transportation, industry, and defense applications. The Automotive Structures & Industry segment offers extruded products and technologically advanced structures for the automotive industry, including crash-management systems, body structures, side impact beams, and battery enclosures; and hard and soft alloy extruded profiles for various industry applications in the automotive, engineering, rail, and other transportation end markets. This segment also provides downstream technology and services, which include pre-machining, surface treatment, research and development, and technical support services. The company sells its products directly or through distributors in France, Germany, the Czech Republic, the United Kingdom, Switzerland, and the United States, as well as Tokyo, Shanghai, and Seoul. Constellium SE was incorporated in 2010 and is headquartered in Paris, France.

- Dynafond Société Anonyme engages in the casting of injected aluminum parts in France. Its products are used in the automotive, aerospace, agricultural, railway, and light industrial applications. The company also exports its products to rest of Europe and North America. The company was founded in 1946 and is based in Etrepagny, France. Dynafond Société Anonyme is a subsidiary of Alufond SAS.

- Elvalhalcor Hellenic Copper and Aluminium Industry S.A., together with its subsidiaries, produces and trades in the rolling and extrusion products made of aluminum, copper, and their alloys in Greece. The company operates through two segments, Copper Products and Aluminium Products. It offers flat rolled aluminum products and solutions; aluminum foil and packaging materials; coated aluminum panels, corrugated sheets, sheets, and coils; zinc rolling products; and aluminum rolling shutters, insect screen and solar protection systems, spacer bars, security doors, and aluminum winding (enameled) wires. The company also provides copper tubes with or without plastic coating and industrial insulation; copper alloy rods and wires, sections, wires, and antimicrobial copper Cu+; and copper and copper alloy products used for various applications, such as sheets, strips, rods, plates, disks, rods, bars, profiles, and components. It serves various industries comprising transportation; heating, ventilation, air conditioning, and refrigeration; packaging; renewable energy; water supply; building and construction; energy and power networks; industrial applications, fish farming, and others. It also exports its products to the European Union, Asia, the United States, Africa, and Oceania. Elvalhalcor Hellenic Copper and Aluminium Industry S.A. is based in Athens, Greece. Elvalhalcor Hellenic Copper and Aluminium Industry S.A. is a subsidiary of Viohalco S.A.

- En+ Group International public joint-stock company engages in the aluminum production and energy generation businesses primarily in CIS, Europe, Africa, and the Americas. It operates in two segments, Metals and Energy. The Metals segment engages in mining and refining bauxite and nepheline ore into alumina; smelting of primary aluminum from alumina; and fabrication of aluminum and aluminum alloys into semi-fabricated and finished products. The Power segment is involved in the power industry, including power generation through hydro, solar, and combined heat and power plants; electricity transmission and distribution activities; coal production business; and supporting operations engaged in the supply of logistics services and coal resources. The company was formerly known as En+ Group plc and changed its name to En+ Group International public joint-stock company in July 2019. En+ Group International public joint-stock company was founded in 2002 and is based in Kaliningrad, Russia.

- Gränges AB (publ) develops, produces, and distributes rolled aluminum products for thermal management systems, specialty packaging, and niche applications in Europe, Asia, and the Americas. The company offers clad tubes and fins, unclad fins, and clad plates. It serves automotive, as well as heating, ventilation, and air

conditioning industries; and other markets, such as transformers, wind turbines, and food packaging industries. The company was founded in 1896 and is headquartered in Stockholm, Sweden.

- Grupa Kety S.A., through its subsidiaries, manufactures and sells aluminum products in Poland and internationally. It operates through three segments: Extruded Products, Aluminum Systems, and Flexible Packaging. The company produces aluminum profiles and components. It also designs and produces architectural systems and external aluminum roller shutters; engages in the production, trade, and servicing of window and door systems, façade systems, roller shutter profiles and boxes, roller-shutters, and gates and accessories for PVC, wood, and aluminum joinery. In addition, the company provides construction and assembly services, as well as flexible packaging solutions. Grupa Kety S.A. sells its products under the Grupa Kety, Aluprof, and Alupol Packaging brands. The company was formerly known as Zaklady Metali Lekkich "KETY" and changed its name to Grupa Kety S.A. in 2000. Grupa Kety S.A. was founded in 1953 and is headquartered in Kety, Poland.

- IMPOL SEVAL Valjaonica Aluminijuma a.d. manufactures and sells aluminum products worldwide. The company offers prepainted coils and sheets, cold and hot rolled coils, hot rolled plates, and billets. Its products are used in automotive, food and beverage, pharmacy, transportation, construction, and electrical industries. The company is based in Sevojno, Serbia. IMPOL SEVAL Valjaonica Aluminijuma a.d. is a subsidiary of Impol, d.o.o.

- Norsk Hydro ASA operates as an integrated aluminum company worldwide. It operates through six segments: Bauxite & Alumina, Aluminium Metal, Metal Markets, Rolling, Extrusions, and Energy. The Bauxite & Alumina segment engages in bauxite mining activities, production of alumina, and related commercial activities, primarily the sale of alumina. The Aluminium Metal segment is involved in the primary aluminum production, remelting, and casting activities. This segment principally offers extrusion, sheet, and standard ingots, as well as foundry alloys. The Metal Markets segment sells products from the company's primary metal plants; operates remelters; and trades in physical and financial metals. The Rolling segment operates rolling mills and a primary metal plant. This segment principally offers aluminum foils, strips, sheets, and lithographic plates for application in the packaging, automotive, building and general engineering, and transport industries, as well as for offset printing plates. The Extrusions segment offers extrusion profiles, building systems, and precision tubing products for construction, automotive and heating, and ventilation and air conditioning sectors. The Energy segment owns and operates 40 hydroelectric power plants in Norway. Norsk Hydro ASA was founded in 1905 and is headquartered in Oslo, Norway.

- ProfilGruppen AB (publ), together with its subsidiaries, designs, develops, manufactures, and markets customized aluminum extrusions and components primarily in Europe. The company serves interior design, construction, electronics, and automotive industries. It also exports its products. ProfilGruppen AB (publ) was founded in 1981 and is headquartered in Åseda, Sweden.

- United Company RUSAL Plc produces and sells aluminum and related products. It operates through four segments: Aluminium, Alumina, Energy, and Mining and Metals. The company is involved in the mining and refining of bauxite and nepheline ore into alumina; the smelting of primary aluminum from alumina; and the fabrication of aluminum and aluminum alloys into semi-fabricated and finished products. Its products include offers primary aluminum, billets, rolling slabs, primary foundry alloys, wire rods, high-purity aluminum, foil and packaging products, aluminum wheels and powders, alumina and bauxite, corundum, gallium, and silicon products, as well as aluminum anodes for cathodic protection. The company is also involved in the mining and sale of coal; generation and transmission of electricity produced from various sources; nickel and other metals production; and trading businesses. In addition, it offers repair and maintenance, and finance services. The company operates in Russia, Turkey, the Netherlands, the United States, South Korea, Italy, Poland, Japan, Germany, France, Norway, Greece, Sweden, China, and internationally. United Company RUSAL Plc was founded in 2000 and is based in Limassol, Cyprus. United Company RUSAL Plc is a subsidiary of En+ Group International public joint-stock company.

All the above company descriptions are provided by the S&P database.

At this point the only needed information for the sample companies - so as to calculate the optimal capital structure for the evaluated company - is the Total Debt and the Market Capitalization of each public company of the sample. The same sample of companies will be used for the CMM valuation methodology, where much more information on the companies' financials is required.

The following table summarizes the needed information for this part of the valuation process. More specifically, the table presents the total debt and the market capitalization value of each company participating in the sample, in million euros. The last column of the table to the right presents the debt to debt and equity ratio of each company. For example, for Alcomet, company number 1, the ratio is calculated to 46% which derives from the following calculation: $59/(59+67) = 0.46$.

Sample companies – Debt to Debt and Equity ratio

	Sample Companies	Country	Total Debt (in mn. €)	Market Cap (in mn. €)	D/D+E
1.	Alcomet AD	Bulgaria	59	67	46%
2.	Alro S.A.	Romania	262	349	43%
3.	Alumetal S.A.	Poland	23	146	13%
4.	Alumil Aluminium Industry S.A.	Greece	175	26	87%
5.	Alumil Rom Industry S.A.	Romania	1	5	23%
6.	AMAG Austria Metall AG	Austria	560	1.076	34%
7.	Biokarpet S.A.	Greece	77	22	78%
8.	Coil S.A./N.V.	Belgium	9	39	18%
9.	Constellium SE	France	2.370	1.646	59%
10.	Dynafond Société Anonyme	France	1	11	8%
11.	Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	Greece	615	653	48%
12.	En+ Group International public joint-stock company	Russia	11.166	5.693	66%
13.	Gränges AB (publ)	Sweden	368	713	34%
14.	Grupa Kety S.A.	Poland	196	779	20%
15.	IMPOL SEVAL Valjaonica Aluminijuma a.d.	Serbia	22	27	45%
16.	Norsk Hydro ASA	Norway	2.536	6.775	27%
17.	ProfilGruppen AB (publ)	Sweden	30	72	29%
18.	United Company RUSAL Plc	Russia	7.385	6.640	53%

Average (excluding negative & outliers)	**44,5%**

The average of the sample companies' debt to debt and equity ratio will be used in the calculation of the Optimal Capital Structure for EP.AL.ME's and subsequently for the calculation of the WACC. A small adjustment was conducted to the average presented at the previous table, as it was evident that two (2) companies were outliers in this calculation. More specifically, Alumil Aluminium Industry S.A. with D/D+E equal to 87% and Dynafond Société Anonyme with D/D+E equal to 8%, were excluded from the calculation of the average D/D+E as outliers.

Having calculated the D/D+E to 44,5% it is easy to calculate the E/D+E which will be 100% - 44,5%. Therefore, E/D+E is 55,5% and that not only concludes my calculation for the Optimal Capital Structure but also, it is the final component for the calculation of the Weighted Average Cost of Capital.

The formula for the calculation of the WACC, as presented in section 4.2.2., is:

$$WACC = \left(\left(\frac{E}{D+E}\right) * Ke\right) + \left(\left(\frac{D}{D+E}\right) * Kdt\right)$$

Based on the previous analysis I have concluded to the following figures.

Cost of Equity	13,1%
After-tax Cost of Debt	3,0%
Target Equity [E/(E+D)]	55,5%
Target Debt [D/(E+D)]	44,5%

$$WACC = 55,5\% * 13,1\% + 44,5\% * 3,0\% = \mathbf{8,6\%}$$

4.2.6. Discounted Cash Flows and Discounted Terminal Value Calculation

Having calculated the proper discount rate (WACC: 8,6%), the next step is to also calculate the Discounted Cash Flows to the Firm. The table below represents the calculation.

Discounted Cash Flows to the Firm

	2018A	2019P	2020P	2021P	2022P	2023P
Free Cash Flow to Firm		**11.176**	**2.218**	**2.853**	**3.105**	**3.047**
WACC:		**8,6%**	**8,6%**	**8,6%**	**8,6%**	**8,6%**
Years from 31.12.2018		1,00	2,00	3,00	4,00	5,00
Discount Coefficient		0,920	0,847	0,780	0,718	0,661
Discounted Cash Flow		**10.287**	**1.879**	**2.225**	**2.229**	**2.013**
Sum of Discounted Cash Flow (2019 - 2023)	**18.633**					

The calculation the Discounted Cash Flows to the Firm was done by calculating the Discount Coefficient. The discount Coefficient is nothing more than a restatement of the Present Value formula presented below.

$$PV = \frac{FV}{(1+i)^n}$$

Where:

PV = Present Value

FV = Future Value

i = rate of return (in this case, discount rate – WACC)

n = number of periods

For example, in order to calculate the Discount Coefficient for year 5, i.e. 2023P, the formula was:

$$(1+i)^{-5}$$

That translates to 0,660730904 which is the Discount Coefficient for year 5.

After calculating the Discount Coefficient the Discounted Cash Flows are produced by calculating the Free Cash Flows to the Firm with the Discount Coefficient.

The Sum of Discounted Cash Flows, for EP.AL.ME. is € 18.633 thousands for the explicit forecast period of 5 years.

EP.AL.ME.'s intrinsic value however, does not only include its Future Cash Flows, it also includes the remaining period (i.e. 1.1.2024 to perpetuity), based on the assumption that the company would continue to operate as a going-concern business. That value is presented though the calculation of the company's Terminal Value, calculated through Myron Gordon's Growth Model.

4.2.7. The Gordon Growth Model and EP.AL.ME.'s Discounted Terminal Value

The Gordon Growth Model (GGM) was initially used to determine the intrinsic value of a stock based on a future series of dividends that grow at a constant rate. It is a popular and straightforward variant of the Dividend Discount Model (DDM). The GGM assumes that dividends grow at a constant rate in perpetuity and solves for the present value of the infinite series of future dividends.

Myron J. Gordon published the model in 1956. A strong influence was the work of John Burr Williams and his 1938 book on the theory of investment value.

Because the model assumes a constant growth rate, it is generally only used for companies with stable growth rates in dividends per share. (Hayes 2021)

For the purpose of this exercise the Gordon Growth Model will be used to calculate EP.AL.ME.'s Discounted Terminal Value, given that the model is a common method for capitalizing terminal cash flows.

The formula for the Gordon Growth Model is as follows:

$$TV0 = \frac{FCF0(1 + g)}{k - g}$$

Where:

TV0 = Value of the company at T=0

FCF0 = Free cash Flow in year 0

k = Discount rate (WACC in this case)

g = Growth rate of FCF, annually compounded in perpetuity

The growth rate used in estimating the terminal value may have a significant impact on the overall valuation of the company. The fact that the stable growth rate is assumed to be sustained forever puts strong constraints on how high the growth rate can be. In general speaking, no company can perpetually grow at a faster rate than the economy in which it operates. Therefore, the growth rate used for estimating the company's terminal value should not exceed the expected growth rate of the economy.

Aswath Damodaran notes that in certain situations the terminal growth rate should be even lower as "there is nothing that prevents us from assuming that mature firms will become a smaller part of the economy and it may, in fact, be the more reasonable assumption to make. Note that the growth rate of an economy reflects the contributions of both young, higher growth firms and mature stable growth firms. Setting the stable growth rate to be less than or equal to the growth rate of the economy not only is the consistent thing to do but it also ensures that the growth rate will be less than the discount rate."

For the purpose of this valuation the growth rate used, was based on the forecasted inflation rate for Greece in 2024, i.e. 1.5%. (E. I. Unit 2021)

The following table presents the calculation of the Discounted Terminal Value for EP.AL.ME.

Discounted Terminal Value for EP.AL.ME.

EBIT (Projected FCF of 2023 *(1+ Growth rate))	*4.059*
Less: Notional Taxes on EBIT (24%)	*974*
EBIT Less Notional Taxes	***3.085***
[-] Change in Working Capital (same as P2023)	*83*
Free Cash Flow to Firm	**3.002**
Growth to Perpetuity [Based on forecasted inflation rate for Greece in 2024]	1,5%
WACC	**8,6%**
Undiscounted Terminal Value (based on Myron Gordon Model)	42.034
Discount Coefficient	0,661
Discounted Terminal Value	**27.773**

4.2.8. Valuation results based on the DCF Method

Based on the analysis described in the previous sections and the DCF valuation method the Estimated enterprise value of EP.AL.ME as of 31.12.2018 is € 46.407 thousands.

EP.AL.ME's published Financial Statements of 2018 report (a) a total debt of € 14.257 thousands and (b) excess cash that amount to € 1.847 thousands. Taking those figures into account EP.AL.ME's estimated market value as of 31.12.2018 is € 33.997 thousands.

The following table presents a sensitivity analysis of how the Weighted Average Cost of Capital and the Growth rate to perpetuity affect the estimated market value of the company.

Sensitivity Analysis (WACC - Growth to Perpetuity)

WACC	Growth to perpetuity		
	1,0%	**1,5%**	2,0%
9,1%	31.845	33.784	36.016
8,6%	32.048	**33.997**	36.239
9,1%	31.845	33.784	36.016

In general, a sensitivity analysis determines how different values of an independent variable affect a particular dependent variable under a given set of assumptions. In other words, sensitivity analyses study how various sources of uncertainty in a mathematical model contribute to the model's overall uncertainty.

To conclude, following the definitions provided in chapter 3.1 - **Introduction and Definitions** EP.AL.ME's "Value in Use", i.e. the present value of the future cash flows expected to be derived from an asset, was estimated to € 33.997 thousands.

In the following chapters I will present the results of the Capital Market Multiples method (CMM) and the Comparable Transactions Multiples method (CT) that were utilized to estimate the "Fair value less costs to sell", i.e. the amount obtainable from the sale of the asset in an arm's length transaction between knowledgeable and willing parties, less the costs of disposal.

The estimation of the "Recoverable Amount" will be the higher amount generated after comparing the results of the "Value in Use" and the "Fair value less costs to sell" in accordance with the requirements of the International Accounting Standard ("IAS") 36 Impairment of Assets, for the purpose of determining whether any impairment adjustment is required in relation to the goodwill recognized in Mytilineos Holdings S.A.'s consolidated financial statements.

5.0 EP.AL.ME S.A. Valuation - Capital Market Multiples method (CMM)

To estimate the "Fair value less costs to sell" for EP.AL.ME's acquisition, I used the Capital Market Multiples method (CMM) and the Comparable Transactions method (CT).

For the CMM method, a sample of comparable companies listed on international stock markets was identified. The companies were found through the S&P Capital IQ database and they are comparable and similar to EP.AL.ME in term of the sector that they operate in and their geographic location. The companies are briefly described in a previous chapter, named **Optimal Capital Structure.**

The purpose of gathering the 18 companies and their financial data, was to conclude on capital market multiples that are then applied to the historical financial parameters of EP.AL.ME for the fiscal year that ended on 31.12.2018. Those parameters comprise Sales, EBITDA, EBIT and other key performance indicators.

The following valuation multiples were calculated:

- Market Cap / Equity Book Value (P/B)
- Market Cap / Revenue
- Market Cap / Net Income (P/E)
- Enterprise Value / Revenue
- Enterprise Value / EBIT
- Enterprise Value / EBITDA

For coherence reasons, I should mention at this point that:

Market capitalization refers to the total market value of a company's outstanding shares of stock. Commonly referred to as "market cap," it is calculated by multiplying the total number of a company's outstanding shares by the current market price of one share.

Equity Book Value is defined as the total assets of a company minus its total liabilities.

Net income is calculated as sales minus cost of goods sold, selling, general and administrative expenses, operating expenses, depreciation, interest, taxes, and other expenses.

Enterprise value (EV) is a measure of a company's total value, often used as a more comprehensive alternative to equity market capitalization. Enterprise value includes in its calculation the market capitalization of a company but also short-term and long-term debt, as well as any cash or cash equivalents that are depicted on the company's balance sheet.

Revenue is the total amount of income generated by the sale of goods or services related to the company's primary operations.

EBIT stands for Earnings Before Interest and Taxes and **EBITDA** stands for Earnings Before Interest, Taxes, Depreciation & Amortization.

5.1 The Financial data of the 18 Comparable companies

In order to calculate the multiples of the comparable companies, according to the Capital Market Multiples method the initial step is to gather the latest available financial data of those companies. In this case and because the reference date for EP.AL.ME's Impairment Testing is 31.12.2019 I gathered the financial data of all 18 comparable companies, as of 31.12.2019.

The table below presents the financial data of the 18 companies. All the company descriptions are provided by the S&P database.

Financial Data – 18 Comparable Companies (31.12.2019) – 1/2

Amounts in € millions

Company Name	Market Cap	EV	Revenue	EBITDA	EBIT	EAT
Alcomet AD	67,5	125,4	177,5	11,11	3,4	4,4
Alro S.A.	349,0	594,2	580,48	27,82	(4,10)	(14,05)
Alumetal S.A.	146,4	155,4	325,48	22,54	15,00	11,87
Alumil Aluminium Industry S.A.	25,5	216,6	241,53	24,03	13,61	3,27

Alumil Rom Industry S.A.	4,5	4,4	14,05	1,33	0,65	0,51
AMAG Austria Metall AG	1.075,6	1.368,7	1.065,97	130,61	48,71	38,64
Biokarpet S.A.	21,7	96,9	125,75	9,09	4,55	1,27
Coil S.A./N.V.	38,8	47,2	29,8	6,17	2,2	1,0
Constellium SE	1.646,2	3.843,2	5.907,0	488,00	240,0	64,0
Dynafond Société Anonyme	11,0	7,2	9,3	2,06	1,9	1,3
Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	652,9	1.232,9	2.044,6	142,57	84,2	41,9
En+ Group International public joint-stock company	5.692,8	17.325,2	10.472,2	3.402,22	2.718,7	1.162,0
Gränges AB (publ)	712,8	1.009,1	1.142,6	125,43	81,7	57,2
Grupa Kety S.A.	778,8	950,5	757,4	122,15	90,5	69,5
IMPOL SEVAL Valjaonica Aluminijuma a.d.	26,7	44,5	117,0	7,58	3,7	4,2
Norsk Hydro ASA	6.774,9	8.323,1	15.188,2	917,48	63,7	(240,1)

ProfilGruppen AB (publ)	71,6	100,3	154,7	16,1	10,8	7,7
United Company RUSAL Plc	6.639,7	12.284,8	8.653,5	2.328,4	1.789,3	855,5

Financial Data – 18 Comparable Companies (31.12.2019) – 2/2

Amounts in € millions

Company Name	Equity Book Value	Minority Interest	Total Debt	Cash	Net Debt (incl. minority interest)	Total Equity
Alcomet AD	112,3	-	58,6	0,7	57,9	112,3
Alro S.A.	160,44	0,5	262,14	17,4	245,2	160,9
Alumetal S.A.	122,26	-	22,79	13,8	9,0	122,3
Alumil Aluminium Industry S.A.	11,69	32,5	175,49	16,9	191,0	44,2
Alumil Rom Industry S.A.	11,27	-	1,37	1,5	(0,1)	11,3
AMAG Austria Metall AG	619,29	-	560,44	267,3	293,1	619,3
Biokarpet S.A.	29,00	0,5	77,20	2,5	75,2	29,5

Coil S.A./N.V.	30,4	-	8,7	0,3	8,4	30,4
Constellium SE	(96,0)	11,0	2.370,0	184,0	2.197,0	(85,0)
Dynafond Société Anonyme	5,8	-	0,9	4,7	(3,8)	5,8
Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	747,2	14,1	614,6	48,7	580,0	761,3
En+ Group International public joint-stock company	3.858,5	2.710,7	11.166,4	2.244,7	11.632,4	6.569,2
Gränges AB (publ)	411,5	-	367,6	71,3	296,4	411,5
Grupa Kety S.A.	347,4	0,3	195,8	24,4	171,7	347,8
IMPOL SEVAL Valjaonica Aluminijuma a.d.	58,2	-	21,9	4,1	17,8	58,2
Norsk Hydro ASA	8.102,5	420,5	2.535,7	1.408,0	1.548,2	8.523,0
ProfilGruppen AB (publ)	38,0	1,7	29,8	2,9	28,7	39,8
United Company RUSAL Plc	6.012,3	-	7.384,5	1.739,4	5.645,1	6.012,3

5.2 The multiples of the 18 Comparable companies

The Multiples are now calculated easily with a simple division. The table below presents the multiples of the 18 companies.

Multiples – 18 Comparable Companies – CMM method

Amounts in € millions

Company Name	Market Cap/ Equity BV (P/B)	Market Cap/ Revenue	Market Cap/ EAT (P/E)	EV/ Revenue	EV/ EBIT	EV/ EBITDA
Alcomet AD	0,6 x	0,4 x	15,4 x	0,7 x	36,5 x	11,3 x
Alro S.A.	2,2 x	0,6 x	(24,8 x)	1,0 x	(144,8 x)	21,4 x
Alumetal S.A.	1,2 x	0,4 x	12,3 x	0,5 x	10,4 x	6,9 x
Alumil Aluminium Industry S.A.	2,2 x	0,1 x	7,8 x	0,9 x	15,9 x	9,0 x
Alumil Rom Industry S.A.	0,4 x	0,3 x	8,9 x	0,3 x	6,8 x	3,3 x
AMAG Austria Metall AG	1,7 x	1,0 x	27,8 x	1,3 x	28,1 x	10,5 x
Biokarpet S.A.	0,7 x	0,2 x	17,1 x	0,8 x	21,3 x	10,7 x
Coil S.A./N.V.	1,3 x	1,3 x	39,0 x	1,6 x	21,5 x	7,7 x

Constellium SE	(17,1 x)	0,3 x	25,7 x	0,7 x	16,0 x	7,9 x
Dynafond Société Anonyme	1,9 x	1,2 x	8,4 x	0,8 x	3,8 x	3,5 x
Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	0,9 x	0,3 x	15,6 x	0,6 x	14,6 x	8,6 x
En+ Group International public joint-stock company	1,5 x	0,5 x	4,9 x	1,7 x	6,4 x	5,1 x
Gränges AB (publ)	1,7 x	0,6 x	12,5 x	0,9 x	12,3 x	8,0 x
Grupa Kety S.A.	2,2 x	1,0 x	11,2 x	1,3 x	10,5 x	7,8 x
IMPOL SEVAL Valjaonica Aluminijuma a.d.	0,5 x	0,2 x	6,4 x	0,4 x	12,0 x	5,9 x
Norsk Hydro ASA	0,8 x	0,4 x	(28,2 x)	0,5 x	130,7 x	9,1 x
ProfilGruppen AB (publ)	1,9 x	0,5 x	9,3 x	0,6 x	9,3 x	6,2 x
United Company RUSAL Plc	1,1 x	0,8 x	7,8 x	1,4 x	6,9 x	5,3 x

In the table above (Multiples – 18 Comparable Companies – CMM method), there are cells that are presented in a grey shading. Those cells include values that are either negatives or outliers. Taking that into account the average multiples of the 18 comparable companies are presented in the table below.

Average multiples – CMM

Market Cap / Equity BV (P/B)	**1,3 x**
Market Cap / Revenue	**0,6 x**
Market Cap / EAT (P/E)	**10,4 x**
EV / Revenue	**0,9 x**
EV / EBIT	**10,4 x**
EV / EBITDA	**7,7 x**

The following step in determining EP.AL.ME's intrinsic value as of 31.12.2018, under the Capital Market Multiples method, which is used to calculate the "Fair value less costs to sell" of the company, is to apply those multiples on EP.AL.ME's financials as of 31.12.2018.

The following table demonstrates the application of the multiples on the company's financials.

Application of multiples - CMM

Amounts in € thousands

Multiple	EP.AL.ME Financial Data	Multi-plier	Enter-prise Value	Minus: Net Debt	Estimated Value of EP.AL.ME (100%)	Weight ing Factor	Value of EP.AL. ME (100%)
Market Cap / Equity BV (P/B)	4.555	1,3 x	5.854	n/a	5.854	20,0%	1.171
Market Cap / Revenue	47.186	0,6 x	25.976	n/a	25.976	20,0%	5.195

Market Cap / Net Income (P/E)	4.165	10,4 x	43.275	n/a	43.275	20,0%	8.655
Enterprise Value / Revenue	47.186	0,9 x	41.008	12.410	28.598	20,0%	5.720
Enterprise Value / EBIT	2.036	10,4 x	21.190	12.410	8.780	10,0%	878
Enterprise Value / EBITDA	2.036	7,7 x	15.703	12.410	3.293	10,0%	329
Estimated Value of EP.AL.ME (100%)						**100,0%**	**21.948**

5.3 CMM Valuation Result

It should be mentioned at this point that, according to both ASC 820 and IFRS 13, Fair Value Measurement, "An entity shall select inputs that are consistent with the characteristics of the asset or liability that market participants would take into account in a transaction for the asset or liability. In some cases those characteristics result in the application of an adjustment, such as a premium or discount (e.g. a control premium or non-controlling interest discount). However, a fair value measurement shall not incorporate a premium or discount that is inconsistent with the unit of account in the accounting standard that requires or permits the fair value measurement. Premiums or discounts that reflect size as a characteristic of the entity's holding (specifically, a blockage factor that adjusts the quoted price of an asset or a liability because the market's normal daily trading volume is not sufficient to absorb the quantity held by the entity) rather than as a characteristic of the asset or liability (for example: a control premium when measuring the fair value of a controlling interest) are not permitted in a fair value measurement." (Pratt 2001)

Based on the previous statement, an adjustment was made on the aforementioned valuation results. The adjustment is a discount due to lack of marketability. Specifically, a discount of 15,8% was applied on the company's estimated value. The discount for lack of marketability (DLOM) was sourced from STOUT and the Restricted Stock Study of 2020, Median Discount.

Lastly, I should mention that even though the acquisition targeted the entire company i.e. all 100% of EP.AL.ME was acquired by Mytilineos Holdings S.A., I did not apply a control premium in the CMM method. Therefore, after the adjustment for lack of marketability the adjusted value of EP.AL.ME based on the Capital Market Multiples method is €18.480 thousands. To that amount I added the company's net debt (€12.410 thousands) and concluded that EP.AL.ME's estimated value is €30.890 thousands based on the Capital Market Multiples method.

6.0 EP.AL.ME S.A. Valuation – Comparable Transactions method (CT)

To estimate the "Fair value less costs to sell" for EP.AL.ME's acquisition, I also used the Comparable Transactions method (CT). The cost of a comparable transaction is one of the major factors in estimating the value of a company. The Comparable Transactions method can help a company arrive at a price for the acquisition that shareholders are willing to accept, and it is based on a very common logic. The company's value will be close to the value of a comparable company that was sold recently. Therefore, again the only information missing is a range of comparable to EP.AL.ME, companies that were sold at around 31.12.2018.

Utilizing the database of S&P Capital IQ, I was able to identify 13 comparable companies that became the target of an acquisition between 1.1.2014 and 31.12.2018. The following table present the sample of the 13 companies.

Comparable Transactions Method – Sample of 13 companies

Amounts in € millions

Announce-ment Date	Target Company	Closed Date	Country	Total Considera-tion	Percent Sought (%)	Implied Equity Value for 100%
11.08.2017	United Company RUSAL Plc	31.08.2017	Cyprus	427,2	7%	6.103,5
07.12.2015	Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	25.02.2016	Greece	60,8	32%	192,4

06.12.2018	GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh	06.12.2018	Germany	54,9	100%	54,9
10.01.2018	Aluminium Dunkerque of Rio Tinto plc	14.12.2018	France	417,7	100%	417,7
02.03.2015	Four Subsidiaries of Aleris International Based in Europe and Asia	01.03.2015	Germany	35,5	100%	35,5
26.01.2018	Strojmetal Aluminium Forging, s.r.o.	24.01.2018	Czech Republic	39,5	55%	71,8
08.04.2014	Etem S.A.	01.12.2014	Greece	3,0	29%	10,3
25.08.2017	Aluminiumwerk Unna AG	23.08.2017	Germany	15,5	25%	61,8
26.04.2016	AHA EMMI Predelava aluminija, d.o.o.	07.06.2016	Slovenia	0,0	100%	0,0
04.06.2018	ST.LA. Srl	04.06.2018	Italy	13,2	100%	13,2
03.09.2014	Norcan SA	03.09.2014	France	6,0	0%	#DIV/0!
30.06.2016	Alumasc Group Plc, Dyson Diecastings Buisness	30.06.2016	United Kingdom	4,8	100%	4,8
10.04.2014	100% Stake in Solna Pressgjuteri AB and 100% Stake in Adc Of Sweden Ab	10.04.2014	Sweden	4,4	100%	4,4

The following paragraphs will provide a brief description for each company included in the sample and a brief mention to the acquisition. Understanding how comparable the companies of the sample are to EP.AL.ME. and the reason of their selection is essential.

- United Company RUSAL Plc produces and sells aluminum and related products. It operates through four segments: Aluminium, Alumina, Energy, and Mining and Metals. The company is involved in the mining and refining of bauxite and nepheline ore into alumina; the smelting of primary aluminum from alumina; and the fabrication of aluminum and aluminum alloys into semi-fabricated and finished products. Its products include offers primary aluminum, billets, rolling slabs, primary foundry alloys, wire rods, high-purity aluminum, foil and packaging products, aluminum wheels and powders, alumina and bauxite, corundum, gallium, and silicon products, as well as aluminum anodes for cathodic protection. The company is also involved in the mining and sale of coal; generation and transmission of electricity produced from various sources; nickel and other metals production; and trading businesses. In addition, it offers repair and maintenance, and finance services. The company operates in Russia, Turkey, the Netherlands, the United States, South Korea, Italy, Poland, Japan, Germany, France, Norway, Greece, Sweden, China, and internationally. United Company RUSAL Plc was founded in 2000 and is based in Limassol, Cyprus. United Company RUSAL Plc is a subsidiary of En+ Group International public joint-stock company.

- Elvalhalcor Hellenic Copper and Aluminium Industry S.A., together with its subsidiaries, produces and trades in the rolling and extrusion products made of aluminum, copper, and their alloys in Greece. The company operates through two segments, Copper Products and Aluminium Products. It offers flat rolled aluminum products and solutions; aluminum foil and packaging materials; coated aluminum panels, corrugated sheets, sheets, and coils; zinc rolling products; and aluminum rolling shutters, insect screen and solar protection systems, spacer bars, security doors, and aluminum winding (enameled) wires. The company also provides copper tubes with or without plastic coating and industrial insulation; copper alloy rods and wires, sections, wires, and antimicrobial copper Cu+; and copper and copper alloy products used for various applications, such as sheets, strips, rods, plates, disks, rods, bars, profiles, and components. It serves various industries comprising transportation; heating, ventilation, air conditioning, and refrigeration; packaging; renewable energy; water supply; building and construction; energy and power networks; industrial applications, fish farming, and others. It also exports its products to the European Union, Asia, the United States, Africa, and Oceania. Elvalhalcor Hellenic Copper and Aluminium Industry S.A. is based in Athens, Greece. Elvalhalcor Hellenic Copper and Aluminium Industry S.A. is a subsidiary of Viohalco S.A.

- GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh represents the combined operations of GF Casting Solutions Singen Gmbh and GF Casting Solutions Mettman Gmbh in their sale to Fondium B.V. & Co. KG. As on December 6, 2018, GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh was acquired by Fondium B.V. & Co. KG. GF Casting Solutions Singen Gmbh engages in manufacturing light metal castings, including aluminum and magnesiu. GF Casting Solutions Mettman Gmbh operates as a foundry that manufactures die-casting metals for passenger vehicles, commercial vehicles, and industrial application. The entities are based in Germany.

- As of December 14, 2018, Aluminium Dunkerque of Rio Tinto plc was acquired by Liberty Industries France S.A.S. Aluminium Dunkerque of Rio Tinto plc comprises aluminum smelting business and is located in France.

- As of March 1, 2015, Four Subsidiaries of Aleris International Based in Europe and Asia was acquired by Sankyo Tateyama, Inc. Aluminum Extrusion Business of Aleris comprises the business unit that manufactures and sells aluminum extrusions products. The assets are located in Germany, Belgium, and China.

- Strojmetal Aluminium Forging, s.r.o. offers aluminum forging services. The company provides forging, machining, die casting, and molding services. Additionally, it offers die designing and construction services. Strojmetal Aluminium Forging, s.r.o. was incorporated in 1998 and is based in Kamenice, Czech Republic. As of January 24, 2018, Strojmetal Aluminium Forging, s.r.o. operates as a subsidiary of MTX Group a.s.

- Etem S.A. provides aluminum extrusion services. It manufactures and sells aluminum industrial profiles primarily in Greece. The company offers various products for doors and windows, including opening doors, single and two leaf windows with tilt and turn mechanisms, sliding systems, fixed frames, rotating windows, swinging doors, large sliding systems with lift and slide functionalities, and systems for the construction of main entrances. It also provides burglar resistant systems, such as opening and sliding systems, systems for doors and main entrances, and curtain wall systems; rolling shutters; and insect screen systems and railing systems. In addition, the company offers curtain wall systems with stick and modular façade systems; sun shading systems with a range of louvers with rounded and orthogonal profiles; and ventilated façade systems for office buildings, hospitals, public buildings, and large residential developments in private and public sectors. Further, it provides security armored doors, such as main entrance security doors for residential and commercial applications; aluminum main entrance doors; internal doors; metal doors for offices, warehouses, stairwells, and industrial areas; and door accessories. Furthermore, the company offers office partition walls; profiles for automotive applications, trailer superstructures and chassis sections, and marine

applications; custom-made profiles for general applications; hard alloy machining bars; and standard profiles. It also exports its products for customers worldwide. The company was founded in 1971 and is based in Magoula, Greece with production facilities in Athens, Greece; and Sofia, Bulgaria. Etem S.A. operates as a subsidiary of Elval Holdings S.A.

- Aluminiumwerk Unna AG manufactures and sells semi-finished aluminum products worldwide. The company provides a range of specialist aluminum alloy products. It offers aluminum tubes such as seamless extruded, porthole extruded, and drawn aluminum tubes, as well as aluminum profiles, spacer bars, and aluminum bars and billets. The company also provides tubes for aircraft applications. The company was formerly known as Messingwerk Aktiengesellschaft and changed its name to Aluminiumwerk Unna AG in February 1979. Aluminiumwerk Unna AG was founded in 1914 and is based in Unna, Germany. Aluminiumwerk Unna AG operates as a subsidiary of Aluminiumwerk Unna Beteligungs GmbH.

- AHA EMMI Predelava aluminija, d.o.o. manufactures anodized aluminum components. It engages in surface and mechanical treatment (of aluminum), rolling/profile making, wood manufacturing, and double modulation floor activities. AHA EMMI Predelava aluminija, d.o.o. was formerly known as Lesnina Emmi d. d. and changed its name to AHA EMMI Predelava aluminija, d.o.o. in September 2007. The company was founded in 1946 and is based in Slovenska Bistrica, Slovenia. As of June 7, 2016, AHA EMMI Predelava aluminija, d.o.o. operates as a subsidiary of Aluform Sp. z o.o.

- ST.LA. Srl manufactures aluminum components including table legs, bed frames, and ladders for the caravan and camper industries. The company was founded in 1975 and is based in Pontedera, Italy. As of June 4, 2018, St.La Srl operates as a subsidiary of Lippert Components, Inc.

- Norcan SA manufactures modular structures made from aluminum profiles and connected by fasteners. It offers closed or slotted aluminum profiles, which include linear guides and modules, workstations, assembly lines and dynamic stocks, safety enclosures, frame works, and conveyors. The company also offers smooth belt conveyors and mesh belt conveyors for applications in industrial logistics and productions; and stainless steel mesh belt conveyors for applications in medical, pharmaceutical, and food industries. In addition, it offers N-CAD software that enables users to design structures incorporating NORCAN profiles and accessories. Further, the company offers design solutions, and assembly and delivery options. It sells its products through distribution networks and catalogues in Finland, Norway, Sweden, the United Kingdom, the Netherlands, Germany, France, Switzerland, and Spain. The company was founded in 1987 and is based in Haguenau, France.

- As of June 30, 2016, Dyson Diecastings Buisness of Alumasc Group Plc was acquired by Broadways Stampings Limited. Dyson Diecastings Buisness of Alumasc Group Plc comprises aluminium and zinc diecast components. The asset is located in the United Kingdom.

- Solna Pressgjuteri AB and Adc Of Sweden Ab represents the combined operations of ADC of Sweden AB and Solna Pressgjuteri AB in their sale to AGES Industri AB. As of April 10, 2014, Solna Pressgjuteri AB and Adc Of Sweden Ab was acquired by AGES Industri AB. ADC of Sweden AB and Solna Pressgjuteri AB manufacture and market die-castings in aluminum and zinc products. ADC of Sweden AB is based in Kulltorp, Sweden. Solna Pressgjuteri AB is based in Upplands Väsby, Sweden.

All the above company descriptions are provided by the S&P database.

6.1 Calculation of Adjusted company value

Similar to the previous method (the CMM), in the Comparable Transactions method I gather the financial data of the sample companies that were publicly available before the acquisition date. The data were used in relevance to the deal size to help me derive in some conclusions about each company's value.

The following table presents the adjusted value of each sample company after its net debt was added to the deal size amount.

Adjusted company value

Amounts in € thousands

Target Company	Adj. Deal Size (for 100%)	Net Debt (incl. minority interest)	Adjusted Enterprise Value
United Company RUSAL Plc	5.139	7.305,6	12.444,8

Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	162	322,1	484,0
GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh	55	-	54,9
Aluminium Dunkerque of Rio Tinto plc	418	-	417,7
Four Subsidiaries of Aleris International Based in Europe and Asia	36	-	35,5
Strojmetal Aluminium Forging, s.r.o.	72	-	71,8
Etem S.A.	10	84,8	95,1
Aluminiumwerk Unna AG	62	17,5	79,3
AHA EMMI Predelava aluminija, d.o.o.	0	-	0,0
ST.LA. Srl	13	-	13,2
Norcan SA	n/a	(3,6)	n/a
Alumasc Group Plc, Dyson Diecastings Buisness	5	-	4,8
100% Stake in Solna Pressgjuteri AB and 100% Stake in Adc Of Sweden Ab	4	-	4,4

6.2 Sample companies' financial data

To be able to calculate the required multiples for the utilization of the Comparable transactions method, I gathered the financial data of the 13 comparable, to EP.AL.ME.

The following table presents those data.

Financial data of the comparable companies sample

Amounts in € thousands

Target Company	Revenue	EBITDA	EBIT	EAT	Equity Book Value (Common)
United Company RUSAL Plc	7.757,9	2.202,64	1.775,79	1.216,58	3.376,28
Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	1.236,1	118,83	67,09	31,81	593,82
GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh	0,0	-	-	-	-
Aluminium Dunkerque of Rio Tinto plc	0,0	-	-	-	-
Four Subsidiaries of Aleris International Based in Europe and Asia	0,0	-	-	-	-
Strojmetal Aluminium Forging, s.r.o.	0,0	-	-	-	-
Etem S.A.	86,0	(5,17)	(11,64)	(22,05)	4,58
Aluminiumwerk Unna AG	64,1	5,19	2,22	0,08	35,17

AHA EMMI Predelava aluminija, d.o.o.	0,0	-	-	-	-
ST.LA. Srl	0,0	-	-	-	-
Norcan SA	10,7	-	1,34	0,97	8,85
Alumasc Group Plc, Dyson Diecastings Buisness	0,0	-	-	-	-
100% Stake in Solna Pressgjuteri AB and 100% Stake in Adc Of Sweden Ab	0,0	-	-	-	-

6.3 Multiples calculation – CT method

Based on the previous financial data, the following valuation multiples were calculated:

- Adjusted Deal Size / Equity BV (P/B)
- Adjusted Deal Size / Revenue
- Adjusted Deal Size / Net Income (P/E)
- Transaction Value / Revenue
- Transaction Value / EBIT
- Transaction Value / EBITDA

The following table presents the calculations of the multiples based on the available information.

Multiples - 13 Comparable Companies – CT method

Target Company	Adj. Deal Size/ Equity BV (P/B)	Adj. Deal Size/ Revenue	Adj. Deal Size/ EAT (P/E)	Transa-ction Value/ Revenue	Transa-ction Value/ EBIT	Transa-ction Value/ EBITDA
United Company RUSAL Plc	1,8 x	0,8 x	5,0 x	1,6 x	7,0 x	5,6 x

Elvalhalcor Hellenic Copper and Aluminium Industry S.A.	0,3 x	0,2 x	6,0 x	0,4 x	7,2 x	4,1 x
GF Casting Solutions Singen Gmbh/GF Casting Solutions Mettman Gmbh	n/a	n/a	n/a	n/a	n/a	n/a
Aluminium Dunkerque of Rio Tinto plc	n/a	n/a	n/a	n/a	n/a	n/a
Four Subsidiaries of Aleris International Based in Europe and Asia	n/a	n/a	n/a	n/a	n/a	n/a
Strojmetal Aluminium Forging, s.r.o.	n/a	n/a	n/a	n/a	n/a	n/a
Etem S.A.	2,3 x	0,1 x	(0,5 x)	1,1 x	(8,2 x)	(18,4 x)
Aluminiumwerk Unna AG	1,8 x	1,0 x	763,0 x	1,2 x	35,8 x	15,3 x
AHA EMMI Predelava aluminija, d.o.o.	n/a	n/a	n/a	n/a	n/a	n/a

ST.LA. Srl	n/a	n/a	n/a	n/a	n/a	n/a
Norcan SA	n/a	n/a	n/a	n/a	n/a	n/a
Alumasc Group Plc, Dyson Diecastings Buisness	n/a	n/a	n/a	n/a	n/a	n/a
100% Stake in Solna Pressgjuteri AB and 100% Stake in Adc Of Sweden Ab	n/a	n/a	n/a	n/a	n/a	n/a

In the table above, there are many cells that include values which are not applicable (n/a). That means that the needed information was not found in the data base and therefore the multiple could not be produced.

In general, having a good sample is very important for valuation methods that are based on the Market approach. In this case the Comparable Transactions method lacks a good sample, therefore in the valuation synthesis, that consists of both CMM and CT, CT should have a smaller weight when calculating the "Fair value less costs to sell" for EP.AL.ME.

In the table above (Multiples – 13 Comparable Companies – CT method), there are cells that are presented in a grey shading. Those cells include values that are either negatives or outliers or not available figures. Taking that into account the average multiples of the 13 comparable companies are presented in the table below.

Average multiples – CT

Adj. Deal Size / Equity BV (P/B)	**1,8 x**
Adj. Deal Size/ Revenue	**0,5 x**
Adj. Deal Size / EAT (P/E)	**5,5 x**

Transaction Value / Revenue	1,3 x
Transaction Value / EBIT	7,1 x
Transaction Value / EBITDA	4,9 x

6.4 CT Valuation Result

The following step in determining EP.AL.ME's intrinsic value as of 31.12.2018, under the Comparable Transactions method, which is used to calculate the "Fair value less costs to sell" of the company, is to apply those multiples on EP.AL.ME's financials as of 31.12.2018.

The following table demonstrates the application of the multiples on the company's financials.

Application of multiples - CT

Amounts in € thousands

Multiple	EP.AL.ME's Financial Data (31.12.2018)	Multi-plier	Enter-prise Value	Minus: Net Debt	Estima-ted Value of EP.AL.ME's Share Capital (100%)	Weigh-ting Factor	Value of EP.AL.ME's Share Capital (100%)
Adj. Deal Size / Equity BV (P/B)	4.555	1,8 x	8.118		8.118	20,0%	1.624
Adj. Deal Size / Revenue	47.186	0,5 x	23.911		23.911	20,0%	4.782
Adj. Deal Size / Net Income (P/E)	4.165	5,5 x	23.039		23.039	20,0%	4.608

Transaction Value / Revenue	47.186	1,3 x	62.109	12.410	49.699	20,0%	9.940
Transaction Value / EBIT	2.036	7,1 x	14.481	12.410	2.070	10,0%	207
Transaction Value / EBITDA	2.036	4,9 x	9.899	12.410	False	10,0%	-
Estimated Value of Company's Share Capital (100.0%)						**100,0%**	**21.160**

To sum up, based on the Comparable Transactions method, EP.AL.ME's intrinsic value, is €21.160 thousands. To that amount I added the company's net debt (€12.410 thousands) and concluded that EP.AL.ME's estimated value is €33.570 thousands based on the Capital Comparable Transactions method.

6.5 Market Approach - Valuation Synthesis

Having analyzed both methods, CMM and CT, so that I am able to calculate the "Fair value less costs to sell" I created a Valuation Synthesis table to present the result of both aforementioned methods.

As previously said, given that the comparable companies sample for the CT method was not adequate, a weight of 80% was given to CMM and the remaining 20% was given to CT when calculating the company's value with both methods.

The following table presents the valuation synthesis of the methods.

Valuation Synthesis – CMM and CT

Amounts in € thousands

Valuation Methods	Estimated Central Market Value per Valuation Method	Weighting Factor	Weighted Value
Comparable Market Multiples	18.480	80,0%	14.784
Comparable Transactions Method (International Sample)	21.160	20,0%	4.232
Market Value of 100% of EP.AL.ME		**100,0%**	**19.016**
[+] Net Debt			12.410
Enterprise Value EP.AL.ME			**31.426**

This calculation concludes the valuation analysis. The only step that remains in order to establish whether Mytilineos Holdings S.A. is required to make an adjustment in the Goodwill presented by EP.AL.ME's acquisition, is find EP.AL.ME's Recoverable amount.

6.6 EP.AL.ME's Recoverable amount and Impairment Testing Results

In section 4 of the present thesis, I utilized the Discounted Cash Flows Method and concluded that EP.AL.ME's "Value in Use" is € 33.997 thousands. In the following sections, I utilized the Capital Market Multiples Method and the Comparable Transactions Multiples Method and concluded that based on these methods, combined, EP.AL.ME's "Fair value less costs to sell" is € 31.426 thousands.

The transaction size for EP.AL.ME's acquisition, by Mytilineos Holdings, S.A. was € 20.000 thousands. That is also Mytilineos Holdings, S.A.'s carrying amount as of 31.12.2019.

Therefore, there is no need for Impairment because the carrying Amount is smaller than EP.AL.ME's Recoverable amount.

The following picture demonstrates the conclusion of the thesis.

EP.AL.ME's Impairment Testing Results
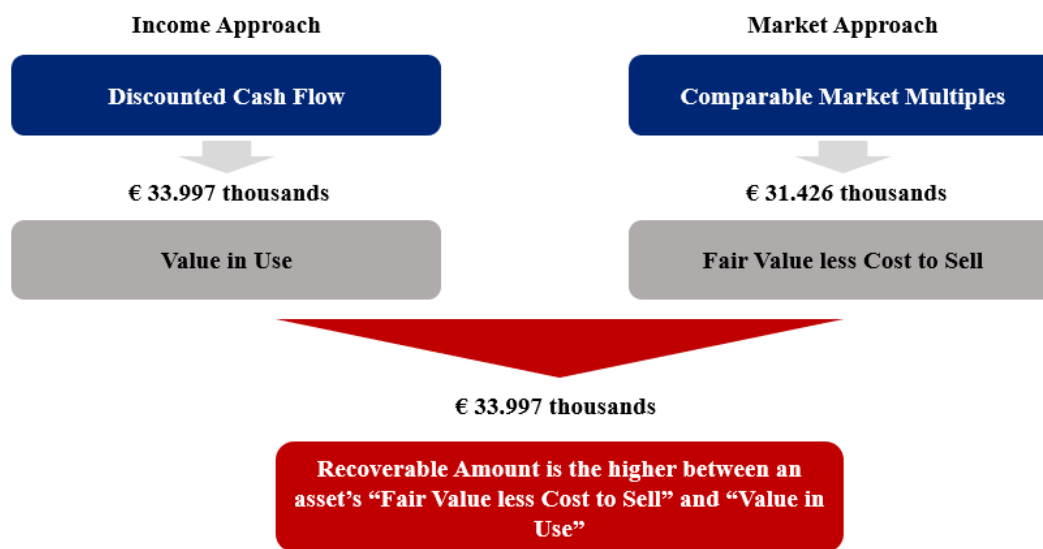
Bibliography

Books and Articles

American Institute of Certified Public Accountants. n.d. "International Glossary of Business Valuation Terms."

Board, Financial Accounting Standards. 2010. *Conceptual Framework for Financial Reporting and IFRS Practice Statements.* Report, London: IFRS Foundation Publications Department.

Damodaran, Aswath. 2006,2nd ed. *Damodaran on Valuation, Security Analysis for Investment and Corporate Finance.*

Duff & Phelp. 2019. «Valuation Handbook – Guide to Cost of Capital.»

Fernandez, Pablo. 2009. *Valuing Companies by Cash Flow Discounting: 10 Methods and 9 Theories.* Paper, SSRN.

Hayes, Adam. 2021. «What Is Gordon Growth Model?» *Investopedia.*

Mr. Jay Fishman, Dr. Shannon Pratt, and Mr. James Hitchner. 2006. *PPC's Guide to Business Valuations.* Toronto: PPC.

Pratt, Shannon P. 2001. *Business Valuation Discounts and Premiums.* Wiley.

Schweihs, Robert F. Reilly and Robert P. 1998. *Valuing Intangible Assets.* New York: McGraw-Hill Education.

Smith, Gordon W. and Russell L. Parr. 2000. *Valuation of Intellectual Property and Intangible Assets.* New York: Wiley.

Unit, Economist Intelligence. 2021. *Country Report -Greece.* Country Report, London: Economist Intelligence Unit.

Unit, The Economist Intelligence. 2021. *Commudites - EIU's monthly aluminium outlook.* Report, EIU.

Websites

https://www.investopedia.com/

http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

http://pages.stern.nyu.edu/~adamodar/

https://www.mytilineos.gr/investor-relations/fy-subsidiaries-statements/

https://www.businessregistry.gr/publicity/index

https://www.aicpa.org/InterestAreas/ForensicAndValuation/Membership/DownloadableDocuments/Intl%20Glossary%20of%20BV%20Terms.pdf

https://cba.associates/glossary/

https://www.bankofgreece.gr/statistika/nomismatikh-kai-trapezikh-statistiki/epitokia-katathesewn-kai-daneiwn

Appendix

A. Risk Free Rate

Pricing Date	United States Treasury - 10 Year	Germany Government Debt - 10 Year	Greece Government Debt - 10 Year
April 1, 2021	1,73%	(0,38%)	1,22%
March 31, 2021	1,67%	(0,42%)	1,21%
March 30, 2021	1,63%	(0,44%)	1,23%
March 29, 2021	1,62%	(0,42%)	1,23%
March 26, 2021	1,63%	(0,41%)	1,24%
March 25, 2021	1,69%	(0,37%)	1,29%
March 24, 2021	1,74%	(0,36%)	1,29%
March 23, 2021	1,71%	(0,32%)	1,32%
March 22, 2021	1,63%	(0,35%)	1,35%
March 19, 2021	1,62%	(0,40%)	1,24%
March 18, 2021	1,62%	(0,40%)	1,19%
March 17, 2021	1,64%	(0,36%)	1,19%
March 16, 2021	1,54%	(0,39%)	1,15%
March 15, 2021	1,53%	(0,37%)	1,21%
March 12, 2021	1,55%	(0,36%)	1,27%
March 11, 2021	1,59%	(0,34%)	1,32%
March 10, 2021	1,56%	(0,36%)	1,34%
March 9, 2021	1,54%	(0,38%)	1,34%
March 8, 2021	1,47%	(0,35%)	1,36%
March 5, 2021	1,42%	(0,41%)	1,37%
March 4, 2021	1,45%	(0,40%)	1,38%
March 3, 2021	1,44%	(0,33%)	1,49%
March 2, 2021	1,54%	(0,30%)	1,51%
March 1, 2021	1,38%	(0,36%)	1,39%
February 26, 2021	1,37%	(0,38%)	1,30%
February 25, 2021	1,37%	(0,41%)	1,26%
February 24, 2021	1,34%	(0,38%)	1,26%
February 23, 2021	1,29%	(0,41%)	1,24%
February 22, 2021	1,29%	(0,43%)	1,18%
February 19, 2021	1,30%	(0,41%)	1,14%
February 18, 2021	1,20%	(0,44%)	1,14%
February 17, 2021	1,20%	(0,49%)	1,11%
February 16, 2021	1,16%	(0,52%)	1,11%
February 15, 2021	1,15%	(0,50%)	1,13%
February 12, 2021	1,18%	(0,51%)	1,13%
February 11, 2021	1,19%	(0,50%)	1,12%
February 10, 2021	1,19%	(0,50%)	1,11%
February 9, 2021	1,15%	(0,52%)	1,10%

February 8, 2021	1,15%	(0,53%)	1,09%
February 5, 2021	1,12%	(0,54%)	1,12%
February 4, 2021	1,09%	(0,57%)	1,12%
February 3, 2021	1,11%	(0,57%)	1,13%
February 2, 2021	1,07%	(0,60%)	1,13%
February 1, 2021	1,04%	(0,60%)	1,13%
January 29, 2021	1,05%	(0,59%)	1,12%
January 28, 2021	1,05%	(0,61%)	1,13%
January 27, 2021	1,10%	(0,56%)	1,15%
January 26, 2021	1,12%	(0,55%)	1,11%
January 25, 2021	1,10%	(0,58%)	1,10%
January 22, 2021	1,10%	(0,58%)	1,17%
January 21, 2021	1,11%	(0,58%)	1,19%
January 20, 2021	1,11%	(0,59%)	1,16%
January 19, 2021	1,15%	(0,60%)	1,19%
January 18, 2021	1,10%	(0,57%)	1,17%
January 15, 2021	1,15%	(0,53%)	1,19%
January 14, 2021	1,15%	(0,55%)	1,14%
January 13, 2021	1,13%	(0,58%)	1,09%
January 12, 2021	1,08%	(0,58%)	1,11%
January 11, 2021	1,04%	(0,59%)	1,13%
January 8, 2021	0,96%	(0,62%)	1,11%
January 7, 2021	0,93%	(0,63%)	1,15%
January 6, 2021	0,93%	(0,60%)	1,16%
January 5, 2021	0,93%	(0,60%)	1,16%
January 4, 2021	0,93%	(0,60%)	1,16%
January 1, 2021	0,94%	(0,61%)	1,17%
December 31, 2020	0,94%	(0,58%)	1,18%
December 30, 2020	0,94%	(0,57%)	1,18%
December 29, 2020	0,94%	(0,57%)	1,18%
December 28, 2020	0,96%	(0,56%)	1,18%
December 25, 2020	0,93%	(0,62%)	1,19%
December 24, 2020	0,95%	(0,62%)	1,19%
December 23, 2020	0,95%	(0,61%)	1,18%
December 22, 2020	0,94%	(0,61%)	1,10%
December 21, 2020	0,92%	(0,59%)	1,09%
December 18, 2020	0,92%	(0,64%)	1,05%
December 17, 2020	0,90%	(0,65%)	1,09%
December 16, 2020	0,90%	(0,66%)	1,08%
December 15, 2020	0,92%	(0,63%)	1,09%
December 14, 2020	0,95%	(0,63%)	1,09%
December 11, 2020	0,92%	(0,64%)	1,12%
December 10, 2020	0,94%	(0,61%)	1,11%
December 9, 2020	0,97%	(0,57%)	1,11%
December 8, 2020	0,92%	(0,57%)	1,10%
December 7, 2020	0,95%	(0,54%)	1,15%

December 4, 2020	0,92%	(0,54%)	1,12%
December 3, 2020	0,84%	(0,59%)	1,10%
December 2, 2020	0,84%	(0,60%)	1,11%
December 1, 2020	0,88%	(0,61%)	1,13%
November 30, 2020	0,88%	(0,59%)	1,15%
November 27, 2020	0,88%	(0,59%)	1,13%
November 26, 2020	0,86%	(0,60%)	1,13%
November 25, 2020	0,83%	(0,61%)	1,15%
November 24, 2020	0,86%	(0,59%)	1,15%
November 23, 2020	0,88%	(0,58%)	1,13%
November 20, 2020	0,87%	(0,58%)	1,13%
November 19, 2020	0,91%	(0,57%)	1,18%
November 18, 2020	0,89%	(0,57%)	1,22%
November 17, 2020	0,88%	(0,55%)	1,27%
November 16, 2020	0,98%	(0,52%)	1,28%
November 13, 2020	0,98%	(0,51%)	1,30%
November 12, 2020	0,96%	(0,53%)	1,34%
November 11, 2020	0,83%	(0,64%)	1,29%
November 10, 2020	0,79%	(0,66%)	1,30%
November 9, 2020	0,78%	(0,66%)	1,33%
November 6, 2020	0,90%	(0,64%)	1,37%
November 5, 2020	0,87%	(0,66%)	1,40%
November 4, 2020	0,88%	(0,65%)	1,44%
November 3, 2020	0,85%	(0,66%)	1,42%
November 2, 2020	0,79%	(0,65%)	1,52%
October 30, 2020	0,79%	(0,63%)	1,40%
October 29, 2020	0,81%	(0,59%)	1,39%
October 28, 2020	0,85%	(0,59%)	1,39%
October 27, 2020	0,87%	(0,58%)	1,40%
October 26, 2020	0,83%	(0,61%)	1,39%
October 23, 2020	0,81%	(0,62%)	1,34%
October 22, 2020	0,78%	(0,64%)	1,31%
October 21, 2020	0,76%	(0,64%)	1,27%
October 20, 2020	0,74%	(0,63%)	1,32%
October 19, 2020	0,73%	(0,60%)	1,26%
October 16, 2020	0,74%	(0,57%)	1,28%
October 15, 2020	0,79%	(0,56%)	1,31%
October 14, 2020	0,79%	(0,56%)	1,37%
October 13, 2020	0,78%	(0,55%)	1,39%
October 12, 2020	0,81%	(0,52%)	1,45%
October 9, 2020	0,76%	(0,54%)	1,49%
October 8, 2020	0,78%	(0,54%)	1,50%
October 7, 2020	0,70%	(0,56%)	1,51%
October 6, 2020	0,68%	(0,55%)	1,54%
October 5, 2020	0,69%	(0,54%)	1,49%
October 2, 2020	0,66%	(0,56%)	1,50%

October 1, 2020	0,67%	(0,54%)	1,50%
September 30, 2020	0,66%	(0,55%)	1,49%
September 29, 2020	0,67%	(0,53%)	1,49%
September 28, 2020	0,68%	(0,52%)	1,43%
September 25, 2020	0,68%	(0,53%)	1,48%
September 24, 2020	0,68%	(0,55%)	1,48%
September 23, 2020	0,70%	(0,51%)	1,49%
September 22, 2020	0,69%	(0,52%)	1,49%
September 21, 2020	0,69%	(0,50%)	1,49%
September 18, 2020	0,68%	(0,50%)	1,50%
September 17, 2020	0,68%	(0,50%)	1,49%
September 16, 2020	0,67%	(0,50%)	1,51%
September 15, 2020	0,68%	(0,45%)	1,52%
September 14, 2020	0,71%	(0,48%)	1,55%
September 11, 2020	0,69%	(0,51%)	1,57%
September 10, 2020	0,72%	(0,48%)	1,56%
September 9, 2020	0,72%	(0,50%)	1,55%
September 8, 2020	0,63%	(0,53%)	1,55%
September 7, 2020	0,66%	(0,50%)	1,56%
September 4, 2020	0,68%	(0,44%)	1,58%
September 3, 2020	0,72%	(0,42%)	1,52%
September 2, 2020	0,74%	(0,44%)	1,52%
September 1, 2020	0,74%	(0,43%)	1,52%
August 31, 2020	0,69%	(0,44%)	1,53%
August 28, 2020	0,69%	(0,45%)	1,53%
August 27, 2020	0,65%	(0,52%)	1,52%
August 26, 2020	0,64%	(0,53%)	1,52%
August 25, 2020	0,65%	(0,52%)	1,52%
August 24, 2020	0,68%	(0,50%)	1,52%
August 21, 2020	0,67%	(0,48%)	1,52%
August 20, 2020	0,69%	(0,47%)	1,55%
August 19, 2020	0,71%	(0,44%)	1,56%
August 18, 2020	0,71%	(0,43%)	1,54%
August 17, 2020	0,69%	(0,47%)	1,52%
August 14, 2020	0,64%	(0,50%)	1,49%
August 13, 2020	0,59%	(0,55%)	1,48%
August 12, 2020	0,57%	(0,53%)	1,45%
August 11, 2020	0,55%	(0,55%)	1,45%
August 10, 2020	0,55%	(0,52%)	1,49%
August 7, 2020	0,52%	(0,57%)	1,49%
August 6, 2020	0,56%	(0,60%)	1,53%
August 5, 2020	0,55%	(0,61%)	1,53%
August 4, 2020	0,55%	(0,62%)	1,50%
August 3, 2020	0,58%	(0,57%)	1,51%
July 31, 2020	0,59%	(0,59%)	1,51%
July 30, 2020	0,62%	(0,57%)	1,52%

July 29, 2020	0,59%	(0,52%)	1,52%
July 28, 2020	0,59%	(0,56%)	1,51%
July 27, 2020	0,60%	(0,57%)	1,58%
July 24, 2020	0,61%	(0,53%)	1,58%
July 23, 2020	0,62%	(0,53%)	1,61%
July 22, 2020	0,64%	(0,52%)	1,66%
July 21, 2020	0,62%	(0,54%)	1,73%
July 20, 2020	0,64%	(0,51%)	1,73%
July 17, 2020	0,63%	(0,51%)	1,72%
July 16, 2020	0,64%	(0,48%)	1,66%
July 15, 2020	0,65%	(0,54%)	1,66%
July 14, 2020	0,62%	(0,54%)	1,56%
July 13, 2020	0,67%	(0,50%)	1,56%
July 10, 2020	0,65%	(0,48%)	1,57%
July 9, 2020	0,69%	(0,49%)	1,61%
July 8, 2020	0,68%	(0,49%)	1,62%
July 7, 2020	0,68%	(0,49%)	1,65%
July 6, 2020	0,69%	(0,45%)	1,65%
July 3, 2020	0,66%	(0,52%)	1,70%
July 2, 2020	0,64%	(0,53%)	1,74%
July 1, 2020	0,64%	(0,53%)	1,75%
June 30, 2020	0,68%	(0,52%)	1,78%
June 29, 2020	0,69%	(0,49%)	1,74%
June 26, 2020	0,72%	(0,46%)	1,77%
June 25, 2020	0,71%	(0,50%)	1,77%
June 24, 2020	0,70%	(0,47%)	1,75%
June 23, 2020	0,71%	(0,46%)	1,75%
June 22, 2020	0,74%	(0,45%)	1,73%
June 19, 2020	0,75%	(0,44%)	1,70%
June 18, 2020	0,71%	(0,45%)	1,76%
June 17, 2020	0,71%	(0,45%)	1,83%
June 16, 2020	0,66%	(0,43%)	1,87%
June 15, 2020	0,75%	(0,34%)	1,95%
June 12, 2020	0,84%	(0,31%)	2,02%
June 11, 2020	0,88%	(0,32%)	1,96%
June 10, 2020	0,91%	(0,27%)	1,90%
June 9, 2020	0,82%	(0,33%)	1,95%
June 8, 2020	0,77%	(0,35%)	2,07%
June 5, 2020	0,68%	(0,42%)	2,05%
June 4, 2020	0,66%	(0,40%)	2,05%
June 3, 2020	0,65%	(0,45%)	2,06%
June 2, 2020	0,70%	(0,43%)	2,06%
June 1, 2020	0,68%	(0,43%)	2,12%
May 29, 2020	0,69%	(0,43%)	2,21%
May 28, 2020	0,66%	(0,50%)	2,25%
May 27, 2020	0,66%	(0,49%)	2,25%

May 26, 2020	0,68%	(0,50%)	2,30%
May 25, 2020	0,68%	(0,47%)	2,36%
May 22, 2020	0,70%	(0,47%)	2,42%
May 21, 2020	0,73%	(0,49%)	2,56%
May 20, 2020	0,64%	(0,53%)	2,62%
May 19, 2020	0,63%	(0,53%)	2,61%
May 18, 2020	0,64%	(0,53%)	2,64%
May 15, 2020	0,69%	(0,51%)	2,71%
May 14, 2020	0,73%	(0,52%)	2,74%
May 13, 2020	0,69%	(0,54%)	2,76%
May 12, 2020	0,63%	(0,54%)	2,76%
May 11, 2020	0,72%	(0,50%)	2,74%
May 8, 2020	0,66%	(0,57%)	2,75%
May 7, 2020	0,64%	(0,55%)	2,72%
May 6, 2020	0,64%	(0,59%)	2,73%
May 5, 2020	0,64%	(0,58%)	2,72%
May 4, 2020	0,63%	(0,49%)	2,76%
May 1, 2020	0,62%	(0,47%)	2,73%
April 30, 2020	0,67%	(0,45%)	2,79%
April 29, 2020	0,60%	(0,47%)	2,90%
April 28, 2020	0,61%	(0,43%)	2,93%
April 27, 2020	0,63%	(0,42%)	3,12%
April 24, 2020	0,58%	(0,48%)	3,04%
April 23, 2020	0,63%	(0,45%)	2,82%
April 22, 2020	0,65%	(0,48%)	2,72%
April 21, 2020	0,61%	(0,47%)	2,74%
April 20, 2020	0,63%	(0,47%)	2,64%
April 17, 2020	0,76%	(0,39%)	2,52%
April 16, 2020	0,76%	(0,35%)	2,36%
April 15, 2020	0,73%	(0,35%)	2,36%
April 14, 2020	0,73%	(0,35%)	2,36%
April 13, 2020	0,77%	(0,32%)	2,35%
April 10, 2020	0,75%	(0,33%)	2,42%
April 9, 2020	0,67%	(0,43%)	2,47%
April 8, 2020	0,62%	(0,46%)	2,54%
April 7, 2020	0,63%	(0,45%)	2,38%
April 6, 2020	0,62%	(0,49%)	2,35%
April 3, 2020	0,70%	(0,48%)	2,27%
April 2, 2020	0,70%	(0,54%)	2,20%
April 1, 2020	0,72%	(0,49%)	2,05%
March 31, 2020	0,83%	(0,39%)	2,12%
March 30, 2020	0,88%	(0,31%)	2,85%
March 27, 2020	0,84%	(0,34%)	2,96%
March 26, 2020	0,76%	(0,40%)	3,54%
March 25, 2020	0,92%	(0,36%)	3,43%
March 24, 2020	1,12%	(0,19%)	3,80%

March 23, 2020	1,18%	(0,26%)	5,04%
March 20, 2020	1,02%	(0,46%)	4,37%
March 19, 2020	0,73%	(0,48%)	3,50%
March 18, 2020	0,94%	(0,60%)	2,92%
March 17, 2020	0,88%	(0,76%)	2,52%
March 16, 2020	0,82%	(0,77%)	2,01%
March 13, 2020	0,76%	(0,82%)	2,14%
March 12, 2020	0,54%	(0,88%)	2,49%
March 11, 2020	0,74%	(0,75%)	2,05%
March 10, 2020	0,92%	(0,70%)	1,94%
March 9, 2020	1,02%	(0,66%)	1,75%
March 6, 2020	1,02%	(0,65%)	1,84%
March 5, 2020	1,10%	(0,65%)	1,98%
March 4, 2020	1,13%	(0,64%)	1,79%
March 3, 2020	1,30%	(0,57%)	1,71%
March 2, 2020	1,33%	(0,52%)	1,68%
February 28, 2020	1,33%	(0,54%)	1,62%
February 27, 2020	1,38%	(0,51%)	1,54%
February 26, 2020	1,46%	(0,47%)	1,46%
February 25, 2020	1,52%	(0,47%)	1,47%
February 24, 2020	1,56%	(0,45%)	1,48%
February 21, 2020	1,55%	(0,44%)	1,48%
February 20, 2020	1,59%	(0,43%)	1,47%
February 19, 2020	1,59%	(0,44%)	1,44%
February 18, 2020	1,61%	(0,43%)	1,47%
February 17, 2020	1,62%	(0,41%)	1,52%
February 14, 2020	1,59%	(0,43%)	1,56%
February 13, 2020	1,56%	(0,45%)	1,56%
February 12, 2020	1,59%	(0,42%)	1,59%
February 11, 2020	1,65%	(0,40%)	1,65%
February 10, 2020	1,66%	(0,41%)	1,73%
February 7, 2020	1,61%	(0,44%)	1,70%
February 6, 2020	1,54%	(0,47%)	1,65%
February 5, 2020	1,51%	(0,48%)	1,71%
February 4, 2020	1,57%	(0,45%)	1,67%
February 3, 2020	1,60%	(0,42%)	1,65%
January 31, 2020	1,65%	(0,39%)	1,63%
January 30, 2020	1,61%	(0,43%)	1,65%
January 29, 2020	1,70%	(0,37%)	1,83%
January 28, 2020	1,74%	(0,35%)	1,88%
January 27, 2020	1,77%	(0,31%)	1,87%
January 24, 2020	1,78%	(0,30%)	1,93%
January 23, 2020	1,84%	(0,27%)	1,98%
January 22, 2020	1,84%	(0,26%)	1,91%
January 21, 2020	1,81%	(0,27%)	1,97%
January 20, 2020	1,79%	(0,25%)	1,93%

January 17, 2020	1,82%	(0,22%)	1,92%
January 16, 2020	1,85%	(0,21%)	1,87%
January 15, 2020	1,83%	(0,24%)	1,91%
January 14, 2020	1,85%	(0,24%)	1,95%
January 13, 2020	1,87%	(0,28%)	1,96%
January 10, 2020	1,83%	(0,30%)	1,96%
January 9, 2020	1,81%	(0,30%)	1,98%
January 8, 2020	1,80%	(0,30%)	2,01%
January 7, 2020	1,88%	(0,24%)	2,08%
January 6, 2020	1,92%	(0,21%)	1,97%
January 3, 2020	1,92%	(0,21%)	1,97%
January 2, 2020	1,90%	(0,20%)	2,08%
January 1, 2020	1,88%	(0,27%)	2,08%
December 31, 2019	1,90%	(0,27%)	2,10%
December 30, 2019	1,90%	(0,27%)	2,10%
December 27, 2019	1,90%	(0,27%)	2,10%
December 26, 2019	1,93%	(0,26%)	2,11%
December 25, 2019	1,92%	(0,27%)	2,04%
December 24, 2019	1,92%	(0,25%)	1,95%
December 23, 2019	1,92%	(0,27%)	1,85%
December 20, 2019	1,89%	(0,31%)	1,84%
December 19, 2019	1,89%	(0,29%)	1,92%
December 18, 2019	1,82%	(0,31%)	1,82%
December 17, 2019	1,90%	(0,28%)	1,84%
December 16, 2019	1,79%	(0,34%)	1,81%
December 13, 2019	1,85%	(0,32%)	1,97%
December 12, 2019	1,83%	(0,32%)	1,93%
December 11, 2019	1,84%	(0,31%)	2,07%
December 10, 2019	1,80%	(0,31%)	2,03%
December 9, 2019	1,77%	(0,34%)	2,02%
December 6, 2019	1,72%	(0,36%)	2,04%
December 5, 2019	1,83%	(0,29%)	2,06%
December 4, 2019	1,78%	(0,37%)	1,97%
December 3, 2019	1,77%	(0,38%)	1,93%
December 2, 2019	1,77%	(0,39%)	1,93%
November 29, 2019	1,74%	(0,39%)	1,92%
November 28, 2019	1,76%	(0,37%)	1,89%
November 27, 2019	1,77%	(0,38%)	1,95%
November 26, 2019	1,77%	(0,34%)	1,93%
November 25, 2019	1,73%	(0,37%)	1,94%
November 22, 2019	1,79%	(0,36%)	1,98%
November 21, 2019	1,81%	(0,36%)	2,07%
November 20, 2019	1,84%	(0,36%)	2,11%
November 19, 2019	1,82%	(0,36%)	2,04%
November 18, 2019	1,88%	(0,33%)	1,96%
November 15, 2019	1,92%	(0,27%)	1,99%

November 14, 2019	1,94%	(0,28%)	1,94%
November 13, 2019	1,94%	(0,29%)	1,87%
November 12, 2019	1,92%	(0,28%)	1,70%
November 11, 2019	1,81%	(0,35%)	1,73%
November 8, 2019	1,86%	(0,34%)	1,72%
November 7, 2019	1,79%	(0,37%)	1,71%
November 6, 2019	1,73%	(0,40%)	1,71%
November 5, 2019	1,69%	(0,43%)	1,70%
November 4, 2019	1,78%	(0,38%)	1,73%
November 1, 2019	1,84%	(0,38%)	1,78%
October 31, 2019	1,85%	(0,36%)	1,72%
October 30, 2019	1,80%	(0,40%)	1,73%
October 29, 2019	1,77%	(0,44%)	1,72%
October 28, 2019	1,77%	(0,43%)	1,82%
October 25, 2019	1,78%	(0,41%)	1,84%
October 24, 2019	1,80%	(0,37%)	1,85%
October 23, 2019	1,76%	(0,42%)	1,83%
October 22, 2019	1,76%	(0,43%)	1,89%
October 21, 2019	1,75%	(0,42%)	1,91%
October 18, 2019	1,77%	(0,45%)	1,94%
October 17, 2019	1,76%	(0,49%)	1,94%
October 16, 2019	1,76%	(0,47%)	2,01%
October 15, 2019	1,67%	(0,52%)	1,97%
October 14, 2019	1,59%	(0,58%)	1,99%
October 11, 2019	1,54%	(0,62%)	1,93%
October 10, 2019	1,56%	(0,60%)	1,95%
October 9, 2019	1,52%	(0,62%)	1,81%
October 8, 2019	1,54%	(0,61%)	1,78%
October 7, 2019	1,60%	(0,58%)	1,91%
October 4, 2019	1,65%	(0,60%)	1,84%
October 3, 2019	1,68%	(0,61%)	1,84%
October 2, 2019	1,69%	(0,61%)	1,86%
October 1, 2019	1,70%	(0,62%)	1,79%
September 30, 2019	1,73%	(0,61%)	1,77%
September 27, 2019	1,64%	(0,64%)	1,75%
September 26, 2019	1,72%	(0,62%)	1,75%
September 25, 2019	1,74%	(0,56%)	1,74%
September 24, 2019	1,79%	(0,54%)	1,87%
September 23, 2019	1,80%	(0,55%)	1,88%
September 20, 2019	1,81%	(0,51%)	1,92%
September 19, 2019	1,84%	(0,51%)	1,97%
September 18, 2019	1,90%	(0,49%)	1,99%
September 17, 2019	1,79%	(0,58%)	1,97%
September 16, 2019	1,75%	(0,60%)	2,08%
September 13, 2019	1,72%	(0,58%)	1,98%
September 12, 2019	1,63%	(0,61%)	1,97%

September 11, 2019	1,55%	(0,67%)	1,98%
September 10, 2019	1,57%	(0,62%)	1,91%
September 9, 2019	1,47%	(0,70%)	1,92%
September 6, 2019	1,47%	(0,76%)	2,03%
September 5, 2019	1,50%	(0,73%)	2,20%
September 4, 2019	1,50%	(0,74%)	2,25%
September 3, 2019	1,50%	(0,73%)	2,20%
September 2, 2019	1,47%	(0,75%)	2,27%
August 30, 2019	1,49%	(0,72%)	2,44%
August 29, 2019	1,54%	(0,70%)	2,52%
August 28, 2019	1,52%	(0,70%)	2,56%
August 27, 2019	1,62%	(0,67%)	2,53%
August 26, 2019	1,59%	(0,71%)	2,57%
August 23, 2019	1,55%	(0,72%)	2,58%
August 22, 2019	1,60%	(0,68%)	2,59%
August 21, 2019	1,55%	(0,71%)	2,61%
August 20, 2019	1,52%	(0,74%)	2,64%
August 19, 2019	1,59%	(0,69%)	2,67%
August 16, 2019	1,68%	(0,65%)	2,75%
August 15, 2019	1,65%	(0,63%)	2,80%
August 14, 2019	1,74%	(0,61%)	2,72%
August 13, 2019	1,72%	(0,60%)	2,69%
August 12, 2019	1,71%	(0,62%)	2,60%
August 9, 2019	1,73%	(0,58%)	2,67%
August 8, 2019	1,75%	(0,55%)	2,67%
August 7, 2019	1,86%	(0,53%)	2,62%
August 6, 2019	1,90%	(0,50%)	2,67%
August 5, 2019	2,02%	(0,48%)	2,63%
August 2, 2019	2,06%	(0,44%)	2,73%
August 1, 2019	2,06%	(0,43%)	2,74%
July 31, 2019	2,08%	(0,42%)	2,76%
July 30, 2019	2,08%	(0,40%)	2,72%
July 29, 2019	2,05%	(0,42%)	2,76%
July 26, 2019	2,08%	(0,40%)	2,73%
July 25, 2019	2,05%	(0,39%)	2,73%
July 24, 2019	2,05%	(0,36%)	2,72%
July 23, 2019	2,04%	(0,35%)	2,88%
July 22, 2019	2,06%	(0,33%)	2,97%
July 19, 2019	2,13%	(0,29%)	3,00%
July 18, 2019	2,09%	(0,29%)	3,06%
July 17, 2019	2,12%	(0,25%)	3,02%
July 16, 2019	2,13%	(0,26%)	2,98%
July 15, 2019	2,07%	(0,31%)	2,96%
July 12, 2019	2,07%	(0,36%)	2,95%
July 11, 2019	2,05%	(0,38%)	2,80%
July 10, 2019	2,04%	(0,36%)	2,90%

July 9, 2019	1,96%	(0,48%)	2,77%
July 8, 2019	1,96%	(0,39%)	2,76%
July 5, 2019	1,98%	(0,36%)	2,86%
July 4, 2019	2,03%	(0,36%)	3,03%
July 3, 2019	2,00%	(0,33%)	3,22%
July 2, 2019	2,01%	(0,32%)	3,24%
July 1, 2019	2,05%	(0,31%)	3,27%
June 28, 2019	2,00%	(0,33%)	3,28%
June 27, 2019	2,02%	(0,31%)	3,22%
June 26, 2019	2,07%	(0,28%)	3,35%
June 25, 2019	2,01%	(0,32%)	3,22%
June 24, 2019	2,03%	(0,29%)	3,19%
June 21, 2019	2,06%	(0,33%)	3,25%
June 20, 2019	2,09%	(0,26%)	3,41%
June 19, 2019	2,09%	(0,26%)	3,41%
June 18, 2019	2,10%	(0,24%)	3,41%
June 17, 2019	2,13%	(0,24%)	3,41%
June 14, 2019	2,15%	(0,23%)	3,47%
June 13, 2019	2,15%	(0,22%)	3,52%
June 12, 2019	2,09%	(0,26%)	3,53%
June 11, 2019	2,12%	(0,24%)	3,61%
June 10, 2019	2,12%	(0,22%)	3,63%
June 7, 2019	2,12%	(0,21%)	3,60%
June 6, 2019	2,07%	(0,20%)	3,57%
June 5, 2019	2,14%	(0,20%)	3,57%
June 4, 2019	2,22%	(0,17%)	3,64%
June 3, 2019	2,25%	(0,17%)	3,76%
May 31, 2019	2,26%	(0,15%)	3,78%
May 30, 2019	2,32%	(0,16%)	3,80%
May 29, 2019	2,32%	(0,12%)	3,93%
May 28, 2019	2,31%	(0,12%)	3,97%
May 27, 2019	2,39%	(0,08%)	3,90%
May 24, 2019	2,43%	(0,06%)	3,93%
May 23, 2019	2,41%	(0,09%)	3,96%
May 22, 2019	2,39%	(0,11%)	3,92%
May 21, 2019	2,40%	(0,09%)	3,97%
May 20, 2019	2,37%	(0,10%)	4,02%
May 17, 2019	2,42%	(0,07%)	4,07%
May 16, 2019	2,40%	(0,07%)	4,07%
May 15, 2019	2,47%	(0,05%)	3,98%
May 14, 2019	2,45%	(0,05%)	3,98%
May 13, 2019	2,49%	(0,05%)	3,87%
May 10, 2019	2,45%	(0,04%)	3,81%
May 9, 2019	2,51%	0,01%	3,82%
May 8, 2019	2,54%	0,02%	3,82%
May 7, 2019	2,55%	0,02%	3,81%

May 6, 2019	2,52%	0,01%	3,83%
May 3, 2019	2,51%	0,02%	3,82%
May 2, 2019	2,54%	0,00%	3,78%
May 1, 2019	2,51%	(0,02%)	3,78%
April 30, 2019	2,54%	(0,01%)	3,81%
April 29, 2019	2,53%	(0,01%)	3,76%
April 26, 2019	2,57%	0,04%	3,82%
April 25, 2019	2,59%	0,02%	3,81%
April 24, 2019	2,57%	0,02%	3,82%
April 23, 2019	2,57%	0,02%	3,79%
April 22, 2019	2,59%	0,09%	3,85%
April 19, 2019	2,60%	0,06%	3,85%
April 18, 2019	2,55%	0,06%	3,85%
April 17, 2019	2,56%	0,06%	3,78%
April 16, 2019	2,51%	(0,01%)	3,85%
April 15, 2019	2,48%	(0,03%)	3,90%
April 12, 2019	2,51%	(0,00%)	3,92%
April 11, 2019	2,52%	0,00%	3,89%
April 10, 2019	2,50%	0,00%	3,90%
April 9, 2019	2,51%	(0,01%)	3,96%
April 8, 2019	2,52%	(0,05%)	4,03%
April 5, 2019	2,48%	(0,05%)	4,01%
April 4, 2019	2,49%	(0,02%)	4,02%
April 3, 2019	2,41%	(0,07%)	4,06%
April 2, 2019	2,39%	(0,07%)	4,00%
April 1, 2019	2,39%	(0,09%)	4,02%
March 29, 2019	2,41%	(0,01%)	4,07%
March 28, 2019	2,43%	(0,02%)	4,06%
March 27, 2019	2,44%	(0,02%)	4,09%
March 26, 2019	2,54%	0,04%	3,96%
March 25, 2019	2,54%	0,08%	4,02%
March 22, 2019	2,61%	0,10%	4,08%
March 21, 2019	2,60%	0,08%	4,09%
March 20, 2019	2,59%	0,09%	4,13%
March 19, 2019	2,63%	0,09%	4,16%
March 18, 2019	2,61%	0,07%	4,13%
March 15, 2019	2,61%	0,06%	4,19%
March 14, 2019	2,64%	0,06%	4,20%
March 13, 2019	2,62%	0,07%	4,24%
March 12, 2019	2,64%	0,07%	4,22%
March 11, 2019	2,69%	0,13%	4,16%
March 8, 2019	2,72%	0,17%	4,18%
March 7, 2019	2,72%	0,16%	4,15%
March 6, 2019	2,76%	0,19%	4,18%
March 5, 2019	2,73%	0,18%	4,14%
March 4, 2019	2,69%	0,16%	4,23%

March 1, 2019	2,64%	0,12%	4,27%
February 28, 2019	2,67%	0,11%	4,28%
February 27, 2019	2,65%	0,10%	4,24%
February 26, 2019	2,69%	0,13%	4,26%
February 25, 2019	2,65%	0,10%	4,29%
February 22, 2019	2,65%	0,10%	4,30%
February 21, 2019	2,66%	0,11%	4,25%
February 20, 2019	2,66%	0,10%	4,34%
February 19, 2019	2,66%	0,10%	4,31%
February 18, 2019	2,71%	0,13%	4,32%
February 15, 2019	2,68%	0,13%	4,36%
February 14, 2019	2,65%	0,11%	4,44%
February 13, 2019	2,63%	0,08%	4,43%
February 12, 2019	2,65%	0,11%	4,45%
February 11, 2019	2,70%	0,17%	4,38%
February 8, 2019	2,71%	0,17%	4,38%
February 7, 2019	2,73%	0,18%	4,41%
February 6, 2019	2,70%	0,17%	4,41%
February 5, 2019	2,63%	0,16%	4,34%
February 4, 2019	2,70%	0,19%	4,43%
February 1, 2019	2,72%	0,20%	4,58%
January 31, 2019	2,75%	0,21%	4,71%
January 30, 2019	2,76%	0,20%	4,76%
January 29, 2019	2,72%	0,18%	4,78%
January 28, 2019	2,76%	0,23%	4,80%
January 25, 2019	2,74%	0,24%	4,83%
January 24, 2019	2,79%	0,26%	4,85%
January 23, 2019	2,79%	0,26%	4,84%
January 22, 2019	2,75%	0,24%	4,85%
January 21, 2019	2,73%	0,22%	4,86%
January 18, 2019	2,72%	0,21%	4,87%
January 17, 2019	2,71%	0,23%	4,88%
January 16, 2019	2,71%	0,24%	4,93%
January 15, 2019	2,74%	0,20%	4,93%
January 14, 2019	2,74%	0,21%	4,91%
January 11, 2019	2,73%	0,23%	4,93%
January 10, 2019	2,70%	0,21%	5,00%
January 9, 2019	2,67%	0,22%	4,98%
January 8, 2019	2,56%	0,16%	5,08%
January 7, 2019	2,66%	0,17%	5,06%
January 4, 2019	2,69%	0,24%	5,00%
January 3, 2019	2,69%	0,24%	5,00%
January 2, 2019	2,72%	0,24%	5,01%
January 1, 2019	2,77%	0,22%	5,05%
December 31, 2018	2,81%	0,25%	5,05%
December 28, 2018	2,74%	0,25%	5,05%

December 27, 2018	2,74%	0,25%	5,05%
December 26, 2018	2,79%	0,25%	5,05%
December 25, 2018	2,79%	0,23%	4,99%
December 24, 2018	2,77%	0,25%	4,95%
December 21, 2018	2,82%	0,25%	5,04%
December 20, 2018	2,86%	0,26%	5,03%
December 19, 2018	2,89%	0,26%	4,90%
December 18, 2018	2,91%	0,27%	4,94%
December 17, 2018	2,91%	0,27%	4,92%
December 14, 2018	2,89%	0,23%	4,93%
December 13, 2018	2,85%	0,24%	5,10%
December 12, 2018	2,85%	0,26%	5,10%
December 11, 2018	2,87%	0,23%	5,01%
December 10, 2018	2,91%	0,28%	4,94%
December 7, 2018	2,91%	0,27%	4,93%
December 6, 2018	2,98%	0,31%	4,86%
December 5, 2018	3,01%	0,31%	5,00%
December 4, 2018	3,03%	0,32%	4,97%
December 3, 2018	3,06%	0,35%	5,01%
November 30, 2018	3,06%	0,35%	5,07%
November 29, 2018	3,07%	0,36%	5,05%
November 28, 2018	3,05%	0,34%	5,12%
November 27, 2018	3,06%	0,37%	5,21%
November 26, 2018	3,06%	0,37%	5,26%
November 23, 2018	3,06%	0,35%	5,28%
November 22, 2018	3,06%	0,37%	5,15%
November 21, 2018	3,08%	0,37%	5,13%
November 20, 2018	3,11%	0,36%	5,11%
November 19, 2018	3,12%	0,40%	5,05%
November 16, 2018	3,14%	0,40%	5,06%
November 15, 2018	3,19%	0,39%	5,02%
November 14, 2018	3,19%	0,41%	4,99%
November 13, 2018	3,24%	0,46%	4,89%
November 12, 2018	3,22%	0,44%	4,89%
November 9, 2018	3,22%	0,43%	4,91%
November 8, 2018	3,20%	0,43%	4,90%
November 7, 2018	3,22%	0,43%	4,88%
November 6, 2018	3,14%	0,40%	4,86%
November 5, 2018	3,15%	0,38%	4,90%
November 2, 2018	3,12%	0,37%	4,91%
November 1, 2018	3,08%	0,38%	4,90%
October 31, 2018	3,08%	0,34%	4,96%
October 30, 2018	3,14%	0,39%	4,86%
October 29, 2018	3,10%	0,39%	4,98%
October 26, 2018	3,17%	0,41%	4,99%
October 25, 2018	3,20%	0,45%	4,98%

October 24, 2018	3,20%	0,44%	5,01%
October 23, 2018	3,17%	0,44%	5,00%
October 22, 2018	3,19%	0,46%	4,90%
October 19, 2018	3,16%	0,49%	4,91%
October 18, 2018	3,16%	0,50%	4,96%
October 17, 2018	3,15%	0,50%	5,05%
October 16, 2018	3,14%	0,52%	5,14%
October 15, 2018	3,22%	0,55%	5,04%
October 12, 2018	3,21%	0,54%	5,11%
October 11, 2018	3,23%	0,55%	5,12%
October 10, 2018	3,23%	0,57%	5,00%
October 9, 2018	3,19%	0,54%	4,98%
October 8, 2018	3,15%	0,47%	4,96%
October 5, 2018	3,05%	0,43%	4,79%
October 4, 2018	3,09%	0,49%	4,75%
October 3, 2018	3,05%	0,47%	4,74%
October 2, 2018	3,06%	0,53%	4,69%
October 1, 2018	3,06%	0,53%	4,66%
September 28, 2018	3,10%	0,55%	4,70%
September 27, 2018	3,08%	0,51%	4,72%
September 26, 2018	3,07%	0,46%	4,65%
September 25, 2018	3,07%	0,48%	4,66%
September 24, 2018	3,08%	0,49%	4,63%
September 21, 2018	3,05%	0,48%	4,61%
September 20, 2018	2,99%	0,46%	4,65%
September 19, 2018	2,99%	0,45%	4,61%
September 18, 2018	2,97%	0,42%	4,57%
September 17, 2018	2,97%	0,41%	4,64%
September 14, 2018	2,98%	0,43%	4,65%
September 13, 2018	2,94%	0,40%	4,81%
September 12, 2018	2,94%	0,39%	4,89%
September 11, 2018	2,88%	0,35%	4,91%
September 10, 2018	2,90%	0,39%	5,03%
September 7, 2018	2,90%	0,36%	4,80%
September 6, 2018	2,86%	0,28%	4,81%
September 5, 2018	2,86%	0,28%	4,78%
September 4, 2018	2,86%	0,29%	4,65%
September 3, 2018	2,89%	0,35%	4,66%
August 31, 2018	2,88%	0,33%	4,65%
August 30, 2018	2,85%	0,32%	4,67%
August 29, 2018	2,82%	0,29%	4,65%
August 28, 2018	2,82%	0,29%	4,56%
August 27, 2018	2,82%	0,29%	4,67%
August 24, 2018	2,85%	0,27%	4,69%
August 23, 2018	2,82%	0,24%	4,72%
August 22, 2018	2,87%	0,24%	4,72%

August 21, 2018	2,87%	0,26%	4,68%
August 20, 2018	2,86%	0,24%	4,55%
August 17, 2018	2,89%	0,27%	4,64%
August 16, 2018	2,88%	0,26%	4,60%
August 15, 2018	2,87%	0,26%	4,48%
August 14, 2018	2,93%	0,32%	4,40%
August 13, 2018	2,96%	0,34%	4,38%
August 10, 2018	2,98%	0,35%	4,38%
August 9, 2018	2,94%	0,32%	4,39%
August 8, 2018	2,95%	0,34%	4,36%
August 7, 2018	2,98%	0,40%	4,35%
August 6, 2018	3,00%	0,42%	4,39%
August 3, 2018	2,96%	0,37%	4,41%
August 2, 2018	2,98%	0,38%	4,39%
August 1, 2018	2,96%	0,34%	4,40%
July 31, 2018	2,98%	0,33%	4,40%
July 30, 2018	2,94%	0,32%	4,38%
July 27, 2018	2,95%	0,32%	4,41%
July 26, 2018	2,96%	0,33%	4,43%
July 25, 2018	2,89%	0,30%	4,39%
July 24, 2018	2,84%	0,27%	4,39%
July 23, 2018	2,88%	0,27%	4,39%
July 20, 2018	2,86%	0,28%	4,37%
July 19, 2018	2,85%	0,30%	4,37%
July 18, 2018	2,83%	0,27%	4,37%
July 17, 2018	2,85%	0,28%	4,37%
July 16, 2018	2,85%	0,29%	4,35%
July 13, 2018	2,87%	0,31%	4,35%
July 12, 2018	2,86%	0,29%	4,48%
July 11, 2018	2,82%	0,28%	4,43%
July 10, 2018	2,84%	0,28%	4,55%
July 9, 2018	2,83%	0,29%	4,51%
July 6, 2018	2,83%	0,27%	4,61%
July 5, 2018	2,87%	0,28%	4,62%
July 4, 2018	2,85%	0,29%	4,62%
July 3, 2018	2,84%	0,30%	4,59%
July 2, 2018	2,83%	0,31%	4,55%
June 29, 2018	2,88%	0,32%	4,68%
June 28, 2018	2,87%	0,31%	4,78%
June 27, 2018	2,90%	0,32%	4,74%
June 26, 2018	2,90%	0,32%	4,84%
June 25, 2018	2,93%	0,36%	4,83%
June 22, 2018	2,89%	0,35%	4,83%
June 21, 2018	2,92%	0,38%	4,91%
June 20, 2018	2,93%	0,38%	4,98%
June 19, 2018	2,94%	0,41%	4,97%

June 18, 2018	2,98%	0,45%	4,96%
June 15, 2018	2,96%	0,47%	4,94%
June 14, 2018	2,96%	0,47%	4,90%
June 13, 2018	2,93%	0,43%	5,02%
June 12, 2018	2,93%	0,48%	5,02%
June 11, 2018	2,97%	0,44%	4,94%
June 8, 2018	2,92%	0,36%	4,94%
June 7, 2018	2,94%	0,39%	4,91%
June 6, 2018	2,89%	0,35%	4,91%
June 5, 2018	2,83%	0,31%	4,92%
June 4, 2018	2,84%	0,32%	5,05%
June 1, 2018	2,77%	0,26%	5,12%
May 31, 2018	2,93%	0,32%	4,99%
May 30, 2018	2,93%	0,38%	4,72%
May 29, 2018	2,98%	0,44%	4,73%
May 28, 2018	3,01%	0,47%	4,73%
May 25, 2018	3,06%	0,53%	4,73%
May 24, 2018	3,06%	0,51%	4,72%
May 23, 2018	3,06%	0,55%	4,54%
May 22, 2018	3,11%	0,61%	4,57%
May 21, 2018	3,09%	0,58%	4,51%
May 18, 2018	3,08%	0,62%	4,44%
May 17, 2018	3,00%	0,61%	4,46%
May 16, 2018	2,97%	0,56%	4,49%
May 15, 2018	2,97%	0,55%	4,52%
May 14, 2018	3,00%	0,56%	4,49%
May 11, 2018	2,97%	0,56%	4,51%
May 10, 2018	2,95%	0,53%	4,33%
May 9, 2018	2,95%	0,54%	4,35%
May 8, 2018	2,94%	0,53%	4,32%
May 7, 2018	2,97%	0,58%	4,32%
May 4, 2018	2,97%	0,56%	4,36%
May 3, 2018	2,95%	0,56%	4,36%
May 2, 2018	2,96%	0,57%	4,38%
May 1, 2018	3,00%	0,59%	4,38%
April 30, 2018	3,03%	0,64%	4,36%
April 27, 2018	3,00%	0,63%	4,25%
April 26, 2018	2,98%	0,63%	4,32%
April 25, 2018	2,96%	0,60%	4,46%
April 24, 2018	2,92%	0,60%	4,44%
April 23, 2018	2,87%	0,53%	4,40%
April 20, 2018	2,82%	0,51%	4,55%
April 19, 2018	2,83%	0,52%	4,59%
April 18, 2018	2,82%	0,51%	4,58%
April 17, 2018	2,83%	0,51%	4,50%
April 16, 2018	2,79%	0,49%	4,53%

April 13, 2018	2,80%	0,53%	4,50%
April 12, 2018	2,78%	0,51%	4,51%
April 11, 2018	2,77%	0,49%	4,52%
April 10, 2018	2,83%	0,52%	4,54%
April 9, 2018	2,79%	0,50%	4,57%
April 6, 2018	2,79%	0,51%	4,73%
April 5, 2018	2,73%	0,50%	4,69%
April 4, 2018	2,74%	0,49%	4,69%
April 3, 2018	2,74%	0,49%	4,69%
April 2, 2018	2,77%	0,50%	4,67%
March 30, 2018	2,78%	0,50%	4,71%
March 29, 2018	2,85%	0,52%	4,65%
March 28, 2018	2,82%	0,53%	4,76%
March 27, 2018	2,83%	0,52%	4,74%
March 26, 2018	2,89%	0,60%	4,73%
March 23, 2018	2,89%	0,58%	4,75%
March 22, 2018	2,85%	0,57%	4,75%
March 21, 2018	2,85%	0,83%	4,70%
March 20, 2018	2,82%	0,83%	4,76%
March 19, 2018	2,81%	0,84%	4,74%
March 16, 2018	2,84%	0,87%	4,76%
March 15, 2018	2,87%	0,88%	4,74%
March 14, 2018	2,90%	0,65%	4,79%
March 13, 2018	2,86%	0,64%	4,80%
March 12, 2018	2,89%	0,66%	4,96%
March 9, 2018	2,88%	0,68%	4,87%
March 8, 2018	2,88%	0,63%	4,89%
March 7, 2018	2,86%	0,60%	4,89%
March 6, 2018	2,81%	0,60%	4,88%
March 5, 2018	2,87%	0,62%	4,92%
March 2, 2018	2,90%	0,64%	4,96%
March 1, 2018	2,86%	0,90%	5,00%
February 28, 2018	2,88%	0,62%	4,93%
February 27, 2018	2,92%	0,67%	4,99%
February 26, 2018	2,94%	0,69%	4,92%
February 23, 2018	2,88%	0,70%	4,91%
February 22, 2018	2,87%	0,71%	4,81%
February 21, 2018	2,87%	0,68%	4,84%
February 20, 2018	2,90%	0,73%	4,98%
February 19, 2018	2,91%	0,72%	4,88%
February 16, 2018	2,83%	0,72%	4,88%
February 15, 2018	2,86%	0,72%	4,88%
February 14, 2018	2,83%	0,71%	4,60%
February 13, 2018	2,85%	0,73%	4,41%
February 12, 2018	2,84%	0,70%	4,26%
February 9, 2018	2,79%	0,66%	4,38%

February 8, 2018	2,77%	0,71%	4,28%
February 7, 2018	2,84%	0,72%	4,22%
February 6, 2018	2,78%	0,67%	4,28%
February 5, 2018	2,72%	0,65%	4,20%
February 2, 2018	2,73%	0,64%	4,22%
February 1, 2018	2,70%	0,64%	4,18%
January 31, 2018	2,66%	0,57%	4,30%
January 30, 2018	2,63%	0,56%	4,27%
January 29, 2018	2,65%	0,54%	4,33%
January 26, 2018	2,63%	0,51%	4,36%
January 25, 2018	2,66%	0,51%	4,34%
January 24, 2018	2,64%	0,52%	4,39%
January 23, 2018	2,62%	0,53%	4,51%
January 22, 2018	2,57%	0,51%	4,38%
January 19, 2018	2,54%	0,51%	4,52%
January 18, 2018	2,55%	0,54%	4,43%
January 17, 2018	2,55%	0,54%	4,47%
January 16, 2018	2,54%	0,54%	4,41%
January 15, 2018	2,55%	0,49%	4,42%
January 12, 2018	2,55%	0,47%	4,34%
January 11, 2018	2,49%	0,44%	4,50%
January 10, 2018	2,47%	0,45%	4,48%
January 9, 2018	2,46%	0,46%	4,54%
January 8, 2018	2,44%	0,45%	4,79%
January 5, 2018	2,46%	0,47%	4,83%
January 4, 2018	2,40%	0,45%	4,84%
January 3, 2018	2,40%	0,45%	4,84%
January 2, 2018	2,43%	0,43%	4,89%
January 1, 2018	2,42%	0,39%	4,88%
December 29, 2017	2,47%	0,43%	4,93%
December 28, 2017	2,48%	0,43%	4,93%
December 27, 2017	2,48%	0,43%	4,93%
December 26, 2017	2,48%	0,43%	4,83%
December 25, 2017	2,49%	0,42%	4,85%
December 22, 2017	2,46%	0,38%	4,94%
December 21, 2017	2,39%	0,31%	4,68%
December 20, 2017	2,35%	0,30%	4,64%
December 19, 2017	2,35%	0,32%	5,00%
December 18, 2017	2,36%	0,31%	5,20%
December 15, 2017	2,40%	0,31%	5,23%
December 14, 2017	2,39%	0,29%	5,11%
December 13, 2017	2,38%	0,30%	5,16%
December 12, 2017	2,37%	0,29%	5,04%
December 11, 2017	2,33%	0,29%	5,24%
December 8, 2017	2,36%	0,32%	5,40%
December 7, 2017	2,37%	0,33%	5,53%

December 6, 2017	2,37%	0,31%	5,62%
December 5, 2017	2,42%	0,37%	5,67%
December 4, 2017	2,37%	0,39%	5,57%
December 1, 2017	2,34%	0,34%	5,58%
November 30, 2017	2,32%	0,34%	5,59%
November 29, 2017	2,34%	0,36%	5,58%
November 28, 2017	2,32%	0,35%	5,56%
November 27, 2017	2,32%	0,35%	5,59%
November 24, 2017	2,36%	0,35%	5,55%
November 23, 2017	2,37%	0,35%	5,47%
November 22, 2017	2,35%	0,35%	5,43%
November 21, 2017	2,37%	0,36%	5,38%
November 20, 2017	2,33%	0,36%	5,30%
November 17, 2017	2,38%	0,39%	5,29%
November 16, 2017	2,40%	0,42%	5,29%
November 15, 2017	2,40%	0,41%	5,39%
November 14, 2017	2,33%	0,38%	5,39%
November 13, 2017	2,32%	0,32%	5,35%
November 10, 2017	2,32%	0,33%	5,33%
November 9, 2017	2,32%	0,34%	5,35%
November 8, 2017	2,34%	0,37%	5,38%
November 7, 2017	2,35%	0,37%	5,36%
November 6, 2017	2,37%	0,37%	5,55%
November 3, 2017	2,38%	0,37%	5,73%
November 2, 2017	2,37%	0,37%	5,83%
November 1, 2017	2,42%	0,39%	5,82%
October 31, 2017	2,46%	0,44%	5,83%
October 30, 2017	2,44%	0,48%	5,85%
October 27, 2017	2,42%	0,48%	5,83%
October 26, 2017	2,38%	0,43%	5,86%
October 25, 2017	2,39%	0,45%	5,84%
October 24, 2017	2,33%	0,39%	5,86%
October 23, 2017	2,34%	0,40%	5,81%
October 20, 2017	2,30%	0,37%	5,75%
October 19, 2017	2,30%	0,37%	5,79%
October 18, 2017	2,28%	0,41%	5,85%
October 17, 2017	2,33%	0,45%	5,91%
October 16, 2017	2,35%	0,46%	5,90%
October 13, 2017	2,35%	0,44%	5,94%
October 12, 2017	2,37%	0,44%	5,95%
October 11, 2017	2,37%	0,46%	5,94%
October 10, 2017	2,35%	0,46%	5,92%
October 9, 2017	2,33%	0,45%	5,95%
October 6, 2017	2,33%	0,46%	5,92%
October 5, 2017	2,34%	0,45%	5,93%
October 4, 2017	2,33%	0,46%	6,00%

October 3, 2017	2,31%	0,49%	6,04%
October 2, 2017	2,31%	0,46%	6,13%
September 29, 2017	2,24%	0,41%	5,98%
September 28, 2017	2,22%	0,40%	5,90%
September 27, 2017	2,26%	0,45%	5,56%
September 26, 2017	2,27%	0,45%	5,57%
September 25, 2017	2,28%	0,44%	5,60%
September 22, 2017	2,24%	0,45%	5,52%
September 21, 2017	2,23%	0,46%	5,48%
September 20, 2017	2,20%	0,44%	5,44%
September 19, 2017	2,20%	0,42%	5,42%
September 18, 2017	2,20%	0,41%	5,44%
September 15, 2017	2,17%	0,40%	5,47%
September 14, 2017	2,14%	0,33%	5,47%
September 13, 2017	2,06%	0,32%	5,49%
September 12, 2017	2,05%	0,31%	5,49%
September 11, 2017	2,10%	0,34%	5,49%
September 8, 2017	2,07%	0,34%	5,51%
September 7, 2017	2,16%	0,37%	5,54%
September 6, 2017	2,16%	0,28%	5,52%
September 5, 2017	2,12%	0,26%	5,52%
September 4, 2017	2,15%	0,25%	5,53%
September 1, 2017	2,13%	0,24%	5,54%
August 31, 2017	2,16%	0,27%	5,55%
August 30, 2017	2,17%	0,29%	5,54%
August 29, 2017	2,19%	0,28%	5,54%
August 28, 2017	2,17%	0,27%	5,56%
August 25, 2017	2,22%	0,30%	5,57%
August 24, 2017	2,18%	0,30%	5,59%
August 23, 2017	2,19%	0,32%	5,60%
August 22, 2017	2,19%	0,33%	5,59%
August 21, 2017	2,23%	0,34%	5,59%
August 18, 2017	2,27%	0,34%	5,54%
August 17, 2017	2,22%	0,31%	5,57%
August 16, 2017	2,19%	0,29%	5,55%
August 15, 2017	2,20%	0,32%	5,50%
August 14, 2017	2,24%	0,33%	5,48%
August 11, 2017	2,29%	0,39%	5,45%
August 10, 2017	2,26%	0,37%	5,46%
August 9, 2017	2,27%	0,38%	5,46%
August 8, 2017	2,24%	0,37%	5,46%
August 7, 2017	2,27%	0,39%	5,44%
August 4, 2017	2,26%	0,39%	5,45%
August 3, 2017	2,30%	0,45%	5,39%
August 2, 2017	2,30%	0,45%	5,37%
August 1, 2017	2,32%	0,43%	5,32%

July 31, 2017	2,29%	0,45%	5,30%
July 28, 2017	2,33%	0,46%	5,30%
July 27, 2017	2,26%	0,40%	5,28%
July 26, 2017	2,24%	0,40%	5,26%
July 25, 2017	2,27%	0,44%	5,26%
July 24, 2017	2,27%	0,44%	5,26%
July 21, 2017	2,27%	0,46%	5,23%
July 20, 2017	2,31%	0,48%	5,27%
July 19, 2017	2,33%	0,49%	5,33%
July 18, 2017	2,35%	0,50%	5,37%
July 17, 2017	2,33%	0,48%	5,38%
July 14, 2017	2,37%	0,53%	5,39%
July 13, 2017	2,38%	0,51%	5,44%
July 12, 2017	2,39%	0,54%	5,44%
July 11, 2017	2,37%	0,54%	5,36%
July 10, 2017	2,33%	0,44%	5,36%
July 7, 2017	2,35%	0,45%	5,31%
July 6, 2017	2,35%	0,46%	5,43%
July 5, 2017	2,31%	0,45%	5,44%
July 4, 2017	2,27%	0,42%	5,44%
July 3, 2017	2,22%	0,34%	5,49%
June 30, 2017	2,21%	0,32%	5,49%
June 29, 2017	2,14%	0,23%	5,39%
June 28, 2017	2,15%	0,24%	5,46%
June 27, 2017	2,15%	0,23%	5,60%
June 26, 2017	2,16%	0,24%	5,57%
June 23, 2017	2,16%	0,25%	5,58%
June 22, 2017	2,19%	0,26%	5,64%
June 21, 2017	2,16%	0,26%	5,68%
June 20, 2017	2,16%	0,27%	5,84%
June 19, 2017	2,15%	0,21%	5,78%
June 16, 2017	2,21%	0,25%	5,84%
June 15, 2017	2,21%	0,24%	5,84%
June 14, 2017	2,21%	0,25%	5,99%
June 13, 2017	2,19%	0,24%	6,07%
June 12, 2017	2,18%	0,24%	6,08%
June 9, 2017	2,14%	0,24%	6,08%
June 8, 2017	2,18%	0,27%	6,06%
June 7, 2017	2,15%	0,25%	6,05%
June 6, 2017	2,21%	0,28%	6,11%
June 5, 2017	2,21%	0,28%	6,14%
June 2, 2017	2,21%	0,28%	6,07%
June 1, 2017	2,25%	0,28%	6,02%
May 31, 2017	2,25%	0,31%	5,98%
May 30, 2017	2,25%	0,35%	6,05%
May 29, 2017	2,26%	0,38%	6,06%

May 26, 2017	2,29%	0,38%	5,82%
May 25, 2017	2,25%	0,37%	5,64%
May 24, 2017	2,23%	0,35%	5,69%
May 23, 2017	2,23%	0,34%	5,76%
May 22, 2017	2,22%	0,37%	5,72%
May 19, 2017	2,33%	0,41%	5,68%
May 18, 2017	2,34%	0,41%	5,69%
May 17, 2017	2,33%	0,39%	5,67%
May 16, 2017	2,39%	0,43%	5,62%
May 15, 2017	2,41%	0,41%	5,62%
May 12, 2017	2,42%	0,43%	5,60%
May 11, 2017	2,39%	0,42%	5,66%
May 10, 2017	2,36%	0,42%	5,60%
May 9, 2017	2,36%	0,39%	5,74%
May 8, 2017	2,33%	0,33%	5,75%
May 5, 2017	2,29%	0,33%	5,74%
May 4, 2017	2,33%	0,32%	6,03%
May 3, 2017	2,29%	0,32%	6,02%
May 2, 2017	2,30%	0,31%	6,12%
May 1, 2017	2,32%	0,35%	6,16%
April 28, 2017	2,35%	0,37%	6,19%
April 27, 2017	2,28%	0,34%	6,17%
April 26, 2017	2,24%	0,24%	6,35%
April 25, 2017	2,24%	0,24%	6,65%
April 24, 2017	2,21%	0,21%	6,42%
April 21, 2017	2,18%	0,18%	6,42%
April 20, 2017	2,26%	0,19%	6,37%
April 19, 2017	2,24%	0,20%	6,64%
April 18, 2017	2,24%	0,19%	6,38%
April 17, 2017	2,28%	0,20%	6,60%
April 14, 2017	2,32%	0,20%	6,71%
April 13, 2017	2,37%	0,22%	6,75%
April 12, 2017	2,38%	0,23%	6,85%
April 11, 2017	2,34%	0,26%	7,10%
April 10, 2017	2,34%	0,26%	7,09%
April 7, 2017	2,36%	0,25%	7,05%
April 6, 2017	2,35%	0,28%	6,96%
April 5, 2017	2,40%	0,33%	6,89%
April 4, 2017	2,42%	0,33%	6,88%
April 3, 2017	2,39%	0,34%	6,90%
March 31, 2017	2,42%	0,38%	7,09%
March 30, 2017	2,38%	0,39%	7,24%
March 29, 2017	2,40%	0,41%	7,12%
March 28, 2017	2,41%	0,42%	7,08%
March 27, 2017	2,40%	0,41%	7,11%
March 24, 2017	2,43%	0,45%	7,14%

March 23, 2017	2,47%	0,44%	7,49%
March 22, 2017	2,50%	0,43%	7,41%
March 21, 2017	2,53%	0,44%	7,05%
March 20, 2017	2,51%	0,41%	7,00%
March 17, 2017	2,60%	0,45%	7,02%
March 16, 2017	2,62%	0,47%	6,87%
March 15, 2017	2,58%	0,49%	6,94%
March 14, 2017	2,60%	0,42%	6,93%
March 13, 2017	2,57%	0,38%	7,18%
March 10, 2017	2,52%	0,32%	6,94%
March 9, 2017	2,49%	0,35%	6,82%
March 8, 2017	2,49%	0,36%	6,75%
March 7, 2017	2,49%	0,31%	6,73%
March 6, 2017	2,46%	0,29%	6,62%
March 3, 2017	2,36%	0,21%	6,86%
March 2, 2017	2,36%	0,21%	7,12%
March 1, 2017	2,31%	0,19%	7,12%
February 28, 2017	2,38%	0,24%	7,05%
February 27, 2017	2,42%	0,28%	7,31%
February 24, 2017	2,43%	0,32%	7,18%
February 23, 2017	2,42%	0,30%	7,55%
February 22, 2017	2,42%	0,31%	7,56%
February 21, 2017	2,45%	0,35%	7,48%
February 20, 2017	2,51%	0,38%	7,76%
February 17, 2017	2,47%	0,37%	7,56%
February 16, 2017	2,43%	0,34%	7,57%
February 15, 2017	2,41%	0,33%	7,34%
February 14, 2017	2,40%	0,31%	7,83%
February 13, 2017	2,34%	0,30%	7,65%
February 10, 2017	2,40%	0,36%	7,80%
February 9, 2017	2,42%	0,38%	7,76%
February 8, 2017	2,49%	0,42%	7,52%
February 7, 2017	2,48%	0,43%	7,20%
February 6, 2017	2,48%	0,47%	7,58%
February 3, 2017	2,45%	0,44%	7,76%
February 2, 2017	2,49%	0,45%	7,59%
February 1, 2017	2,49%	0,46%	7,23%
January 31, 2017	2,51%	0,49%	6,96%
January 30, 2017	2,53%	0,47%	6,86%
January 27, 2017	2,47%	0,39%	6,91%
January 26, 2017	2,41%	0,37%	6,99%
January 25, 2017	2,48%	0,42%	7,08%
January 24, 2017	2,47%	0,37%	7,00%
January 23, 2017	2,42%	0,35%	7,10%
January 20, 2017	2,33%	0,32%	6,82%
January 19, 2017	2,40%	0,33%	7,02%

January 18, 2017	2,40%	0,35%	6,69%
January 17, 2017	2,36%	0,31%	6,92%
January 16, 2017	2,38%	0,28%	6,89%
January 13, 2017	2,38%	0,30%	6,92%
January 12, 2017	2,38%	0,31%	6,92%
January 11, 2017	2,42%	0,32%	6,82%
January 10, 2017	2,37%	0,28%	6,82%
January 9, 2017	2,46%	0,30%	6,49%
January 6, 2017	2,45%	0,30%	6,94%
January 5, 2017	2,45%	0,22%	7,10%
January 4, 2017	2,45%	0,22%	7,10%
January 3, 2017	2,49%	0,20%	7,14%

B. ERP – Professor Damodaran

Country and Equity Risk Premiums

Date of update: Ιαν-20

Enter the current risk premium for a mature equity market					5,20%	Updated January 1, 2020		
Do you want to adjust the country default spread for the additional volatility of the equity market to get to a country prem					Yes			
If yes, enter the multiplier to use on the default spread (See worksheet for volatility numbers for selected emerging mark					1,18	Updated January 1, 2020		

Country	Africa	Moody's rating	Rating-based Default Spread	Total Equity Risk Premiu	Country Risk Premium	Sovereign CDS, net of US	Total Equity Risk Premium2	Country Risk Premium3
Greece	Western Europe	B1	3,76%	9,64%	4,44%	1,78%	7,30%	2,10%