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THE FUTURE OF TOBACCO STOCKS

A scenario analysis

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The Future of Tobacco Stocks: A Scenario Analysis

EXECUTIVE SUMMARY

This report provides an evaluation of the value of tobacco firms and their underlying stocks.
Drawing on an analysis of the tobacco industry and its corresponding risk factors, a scenario analysis has been conducted which aims to assess the future state of the industry and the development of tobacco firm stocks.

The industry has been analysed from a political, economic, social and technological perspective. For each perspective, key drivers of change have been identified and further investigated. The key drivers of change serve as the basis for the scenario analyses and determine the outcome of each scenario. Using varying weights and significances for each driver, we posited three future potential states of the industry. Scenario I incorporates modestly increasing revenues, stable costs and low costs of capital. Scenario II features a lower increase in revenues and simultaneously an increase in operational costs. Scenario III envisions significant decreases in revenues and overall profitability.

Based on the findings that most firms are presently confronting the challenges of Scenario II and Scenario III, we conclude that the industry is likely to find itself somewhere between these two scenarios. The implication for investors is that a higher risk factor must be incorporated in the valuation of tobacco firms, which in the long run is likely to decrease the attractiveness of their stocks.

The authors acknowledge that this study is subject to several limitations. First, as this report is independent of the complex tobacco industry, it does not benefit from a wide range of opinions from different groups within the industry. Second, the data and assumptions of the valuation tool for the scenario analysis is limited to certain companies and thus scalable only to a certain extent. Third, despite diligent investigation and reasoned argumentation, the assumptions regarding the key drivers are based on the researchers' views.

TABLE OF CONTENTS

INTRODUCTION

Investors all around the world, from private individuals to institutional investors with billions of assets under management, aim to generate the highest possible return on investment. With this goal in mind, investing in the tobacco industry has been a common practice among investors for decades. Historically, the outstanding performance of tobacco stocks has brought strong returns and generous dividends. Looking forward, the addictive nature of the product and attractive market opportunities, particularly in emerging markets, points towards a continuing solid return on investment for tobacco stocks. Recently, however, trends towards healthier lifestyles and increased understanding of the negative consequences of tobacco use have led to a multitude of risk factors, such as increased litigation and greater regulation, that could have a significant negative impact on the value of tobacco stocks. Even though quite extensive research on the different risks has already been done, it remains difficult to comprehensively account for all of them in valuation exercises aiming to predict their impact on future tobacco stock prices. This problem stands in the way of answering a fundamental question with implications for all investors interested in tobacco stocks: Beyond the ethical incentive, is there also a *financial incentive* to divest from tobacco stocks?

Of course, this question cannot be answered with certainty, as to do so would require the ability of foresight. Since we nevertheless wanted to get as close as possible to providing an answer, we began looking for an appropriate, answerable research question and an effective research method. In order to do so, we partnered with Cardano, a leading Dutch risk management firm. Cardano developed a survey that was distributed among the small group of stakeholders in this project with the aim of finding the best possible research question and method. The results of the survey clearly indicated that the best way to tackle the issue would be to use scenario thinking, which led to our final research question: How does the value of tobacco stocks change under various scenarios?

Scenario thinking is a research technique in which multiple possible and realistic scenarios of the future are developed, based on the current status and prevailing trends. However, in order to make assumptions about the impact of such scenarios on the actual value of tobacco stocks, we first had to identify the key drivers of change for tobacco stock value. Having identified these drivers of change, we could then develop the scenarios with a focus on their impact on these key drivers, which then allowed us to predict their impacts on the value of tobacco stocks. In a first attempt to identify the key drivers of change, the Cardano survey asked respondents to outline what they believed to be the most important

drivers. We then performed an in-depth industry analysis and identified six key drivers of change based on the results of that analysis. Eventually, three different scenarios in the global tobacco industry emerged: a somewhat optimist one, a fairly realistic one, and the worst-case scenario from tobacco firms' point of view. It is important to stress that we do not believe any scenario to be more important or more likely than the others. Those scenarios are based on an extrapolation of the identified drivers, which are based on current developments in the industry and informed by additional research and personal assessment.

Using the insights gained from devising these scenarios, we were able to start working with our valuation tool. As a start to our valuation tool we applied an approach developed by Koller, Goedhart and Wessels (2010), which is used extensively by both academics and practitioners. However, because their tool was designed to conduct a more traditional discounted cash flow valuation, we adapted it to fit the needs for our research. Even more important for a successful valuation than the sophistication of the model, however, are the assumptions on which it is based. It is at this stage that our scenarios become useful for the valuation, as the assumptions for the key value drivers in our tool are based on the various narratives of our scenarios. In this way, we were able to combine the open-minded, innovative nature of scenario thinking with the hard mathematical rigour of a more traditional corporate finance valuation tool. The specific assumptions that we made can be found in the appendix of this report, in a technical guide that explains our approach to the valuation question. We would like to emphasise that the values that we will later present are simply indications of what, in our opinion, would happen to the value of tobacco stock under that specific scenario. We emphatically do not claim to be able to predict the future, but we contend that it is very interesting to see what happens to the value of a tobacco firm when one values it under three different scenarios which, we argue, are all based on modest and reasonable assumptions.

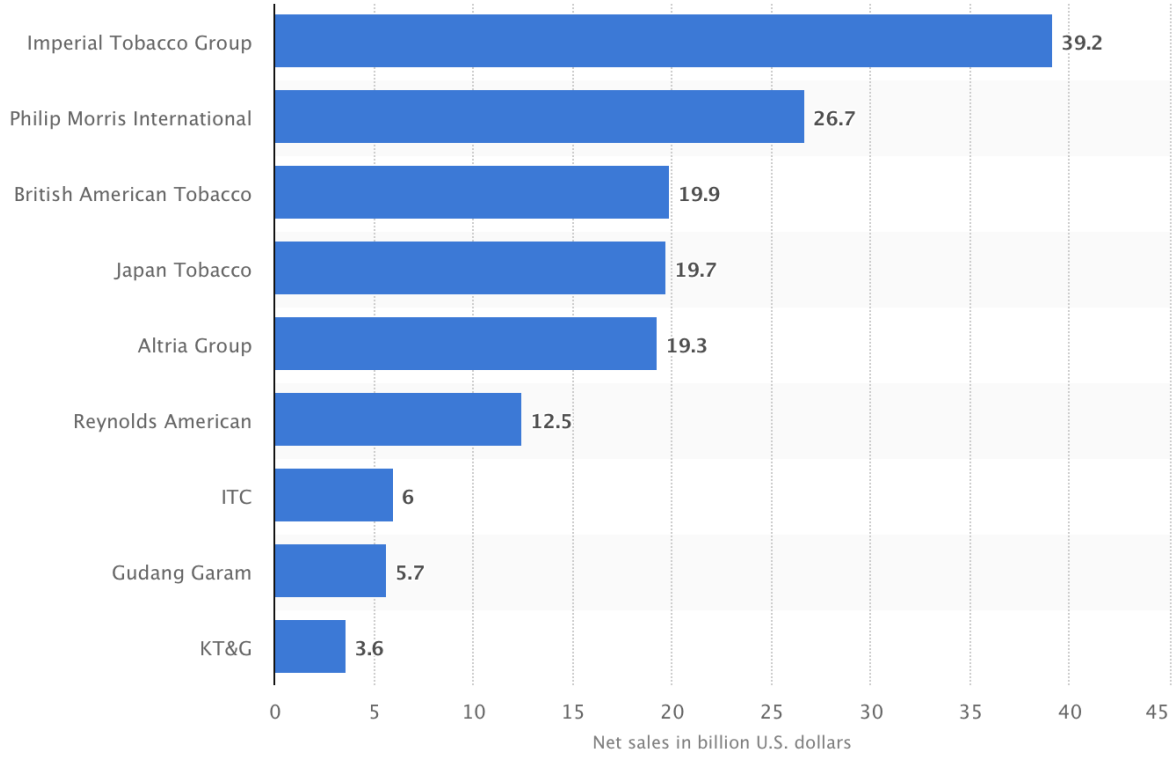
This paper is divided into four sections. Section one is a brief background report on the tobacco industry, based on a PEST analysis (political, economic, social, technological) framework, and narrows down into the identification of the key drivers of change within the industry. Section two outlines our three scenarios and their impact on the value of tobacco companies. Section three provides the key conclusions from our valuation tool and identifies suggestions for further research. Section four concludes, and the appendix provides a detailed description of the valuation outcomes and the methodology.

1. Background Report and Drivers of Change

1.1. INDUSTRY INTRODUCTION

The global tobacco industry is comprised of a small number of multinational enterprises that supply the majority of tobacco consumers worldwide. Figure 1 indicates that the biggest four companies, in terms of annual net sales, are Imperial Brands plc, Philip Morris International, British American Tobacco and Japan Tobacco. Combined, these four companies generate over US $100 billion in net sales per year.

Figure 1: Largest tobacco companies worldwide in 2017, based on net sales (in billion U.S. dollars)



Source: Statista (2018)

Although the health hazards of smoking are commonly known, about 5,505 billion cigarettes were consumed in 2016 (MacGuil, 2017). In addition to focusing on health risks, tobacco opponents have been criticising tobacco firms' marketing practices and highlighting the impact of second-hand smoke and the addictive nature of the products for at least the past 20 years (Explained, 1998). Two decades

later, criticism directed at the tobacco industry has intensified and has been extended to their manufacturing conditions and the environmental impact (Human Rights Watch, 2018).

Although these developments would lead to the assumption that the tobacco industry as a whole is involved in unethical or at least questionable practices, the tobacco stock universe report of Arabesque (2018) reveals that the largest of the tobacco firms, such as Philip Morris, Imperial Brands, British American Tobacco and Japan Tobacco, do relatively well with respect to sustainability and adherence to social and ethical norms. The organisation reports the sustainability of firms via two indicators. First, the GC score, which is a norm-based company assessment, measures a firm's financial materiality sustainability along the dimensions Human Rights, Labour Rights, Environment and Anti-Corruption. Second, the ESG score provides a sector-specific analysis of a company's performance on material environmental, social and governance issues.

Table 1 reports the corresponding values of the GC and ESG score for the four largest tobacco firms, the average scores of the tobacco industry and the scores of the entire Universe of the Arabesque S-Ray database, which includes over 7,000 corporations worldwide of different sizes, in a range of industries. Though these scores do not take into account the health issues associated with product consumption, it can be seen that, on average, the tobacco industry, and all sample companies except for British American Tobacco, have a higher GC and ESG score than the average firm in the dataset. This indicates that the majority of firms in other industries are doing worse in terms of social responsibility and sustainability. Thus, on average, these four companies are committing either similar or slightly more resources into sustainable operations, compared with firms in other industries. Therefore, overall it seems contradictory that the tobacco industry should attract greater criticism than industries with lower GC and ESG scores. One explanation could be the root of the criticism. Since many opponents of the tobacco industry see the negative impact on users' health, the products' addictiveness and the risks of second-hand smoke as inherently unethical and irresponsible, criticism is addressed towards the use of the product rather than the production of the product. Controversies regarding the use of child labour and the environmental impact of tobacco farming can be seen as additional criticisms which serve to support the main arguments. Therefore, it seems likely that the tobacco industry is the subject of boycotts not because of their business operations, but because of the impact of the products they produce.

Table 1: ESG and GC scores of selected sample groups in 2018

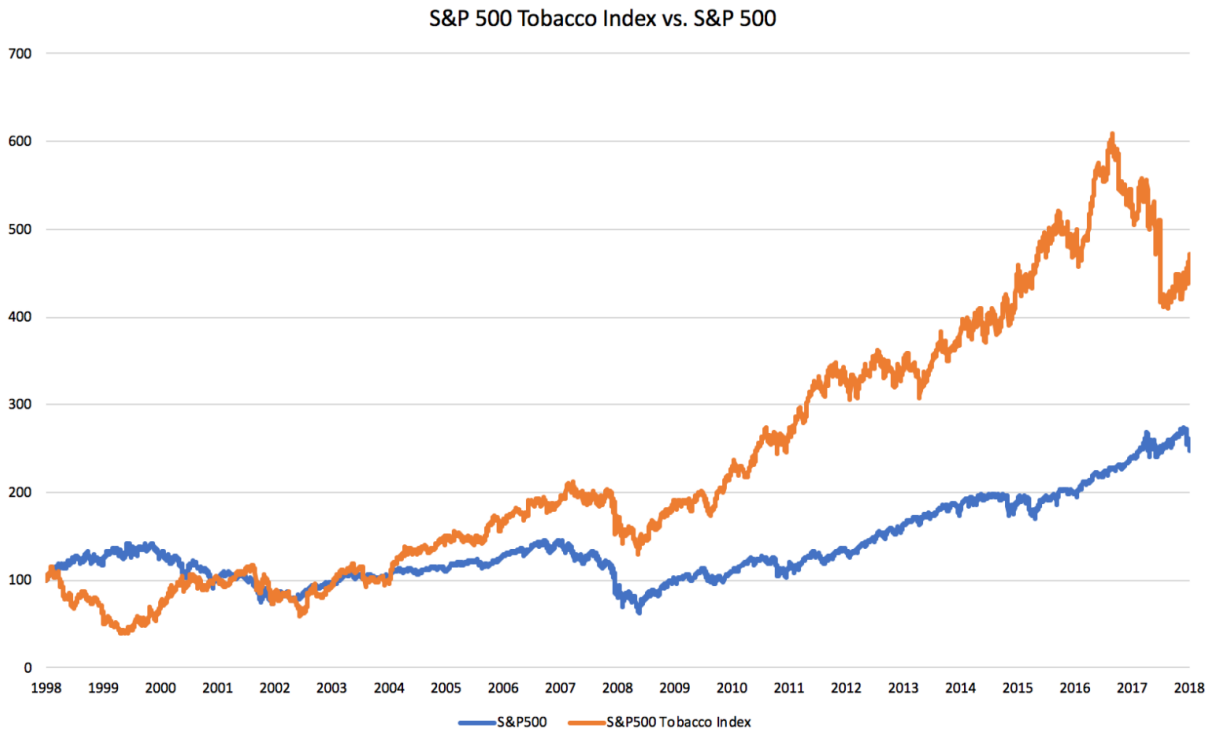
Sample Group	ESG Score	GC Score
Tobacco industry (average)	57.11	60.31
Universe (average)	50.48	53.84
Japan Tobacco	61.03	64.67
Imperial Brands	56.33	62.47
British American Tobacco	40.18	62.47
Philip Morris International	57.26	59.90

Source: Arabesque S-Ray (2018)

Despite the widespread criticism it attracts, the tobacco industry is on average outperforming other industries typically seen as less controversial and not based on a "sinful" business. The global tobacco market is estimated to be worth around US $760 billion, excluding China, which is generally considered the world's largest cigarette market (British American Tobacco, 2018). In other words, if the global tobacco industry were a country, its GDP would be comparable to that of nations such as the Netherlands, Switzerland and Saudi Arabia. The 5.505 billion cigarettes consumed each year generate the vast majority of tobacco companies' revenue. The industry's size is accompanied by strong historic performance of tobacco companies' stocks, which have exhibited robust growth and extraordinarily high dividend yields. As Lewis & Birt (2017) point out, the S&P 500 Tobacco Index outperformed the S&P 500 by more than 1,000% between 1989 and 2017 (See Figure 2).

However, more recently this trend has stalled. Between April 2017 and April 2018, the S&P 500 Tobacco Index had a negative change of 23.4%, whereas the S&P 500 generated a positive return of 11.1%. Notably, the shares of Imperial Brands fell by 30% over the past year, causing the company to announce asset sales of up to UK £2 billion, while expanding its e-cigarette product offers (Geller, 2018).

Figure 2: S&P 500 Tobacco Index vs. S&P 500 Index



Source: FactSet (2018)

Another even more recent example is a drop of more than 22% in Philip Morris International's (PMI) stock during 2018, as of June 15, 2018, based on stock market data from FactSet.

In order to analyse current trends in global tobacco industries and identify key drivers of change, we have focused on the industry's political (P), economic (E), social (S), and technological (T) environments. The political environment describes to what extent governments influence economies and the industries operating in them, and involves taxes, subsidies, trade tariffs and other policies. The economic environment is shaped mainly by the difference in economic development across the world, in which emerging markets and developing economies experience threats and opportunities that differ markedly from those in the developed world. The social environment is characterised by cultural differences and demographics, and factors including the prevalence of consumer boycotts and divestment. Finally, the technological environment includes innovative changes in technology, which in turn shape the (tobacco) business environment. The most recent and relevant technological developments in the tobacco industry include smoke-free products such as e-cigarettes (Tobacco Atlas, 2018).

1.2. POLITICAL ENVIRONMENT

1.2.1. LEGALISATION OF ILLICIT DRUGS

The legalisation of illicit drugs such as marijuana in a number of jurisdictions around the world points to an opportunity for tobacco firms to diversify their product portfolios. According to analysis (Caps, 2017), tobacco firms are preparing to enter the marijuana market and exploit their capabilities in farming, marketing and distribution. It is expected that the liberalisation of marijuana use will have a positive effect on the number of people smoking tobacco. A study by Petton et al. (2005) predicts that the weekly use of cannabis increases tobacco smoking among 20- to 24-year olds threefold, which in turn leads to nicotine dependency later on. The concomitant use of marijuana and tobacco presents undesirable effects such as reduced motivation and more difficulty in quitting, as well as higher levels of nicotine dependence among youth and young adults. A further study by Wang and Catadlo (2016) has indicated that in the long term, the legalisation of marijuana could be linked to increased cigarette and marijuana co-use in adults, and thus to a higher nicotine dependence and cigarette consumption.

Badiani et al. (2015) further investigated the direction of this relationship and found a “gateway” effect, which describes the progression from tobacco and alcohol use to other illicit drugs such as cannabis. However, they argue that it is possible that it is not tobacco, but other confounding factors, that are key in this progression. The authors argue that a “reverse gateway” effect exists in the transition from cannabis use to tobacco consumption. Their model suggests that the association between tobacco and cannabis use arises from a reciprocal feedback loop between the use of the two substances. Although these findings point to a beneficial effect for the tobacco industry, owing to a potential increase in tobacco consumption, the National Academies of Sciences, Engineering and Medicine (2017) argue that there is only limited evidence for a positive relationship between the consumption of cannabis and tobacco. It analysed multiple studies into the relationship between cannabis use and the consumption of other substances such as tobacco or nicotine. Since the investigated studies varied in their methodologies and investigated populations, the National Academies of Sciences, Engineering and Medicine meta-analysis did not find strong evidence that the initiation of marijuana use leads to a general increase in tobacco consumption. In particular, the committee found a limited evidence that the use of cannabis increases the rate of initiating other drugs such as tobacco and a moderate evidence for the existence of a relationship between cannabis use and the development of substance dependence and/or a substance abuse disorder, for illicit drugs such as tobacco or alcohol.

To conclude, although the specific relationship of the concomitant use of marijuana and tobacco is unclear, it is certain that the legalisation of previously illegal drugs will have an impact on the operations of tobacco firms. Therefore, the legalisation of cannabis will change the current tobacco industry, either in terms of product offering or in the demand for tobacco.

1.2.2. REGULATIONS

According to Levy et al. (2016), more than 53 million people worldwide have stopped smoking as a result of the implementation of tobacco regulations between 2008 to 2014. This number is likely to rise in future, as more governments in developed and developing markets aim to impose stronger regulations on the tobacco industry. Investors, health systems, insurers and pension funds with a combined total of US $3.8 trillion in assets under their management are strongly in favour of stricter tobacco control (PRI, 2017). Efforts towards stricter tobacco regulation have led to countries that collectively comprise 40% of the world's population having implemented at least one recommended tobacco control policy (World Health Organization, 2015a). The WHO states that smoking prevalence decreased from 23% to 21% between 2007 and 2013, which indicates that regulations seem to have considerable impact.

Thus far, regulations appear to have been successful in decreasing tobacco consumption. In contrast, challenging tobacco firms through judicial processes seems to have been largely unsuccessful, especially in the case of US firms (Carr et al. 2018). But according to The Canadian Press (2017), current cases in which Canadian provinces, starting with British Columbia, are suing the tobacco industry over higher public health care costs resulting from the use of their products could result in a precedent-setting victory that would spur other jurisdictions to pursue similar litigation.

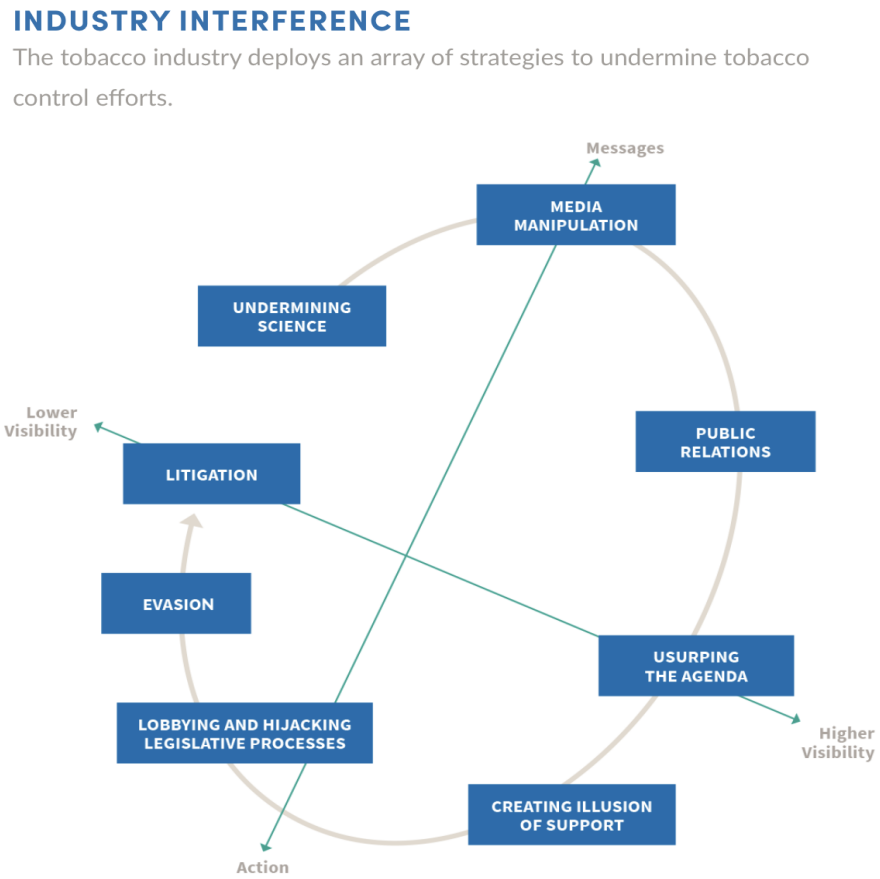
Looking beyond the currently rather low litigation risk for the tobacco industry, most of these firms have been successful in avoiding fines related to regulation violations (MSCI, 2015). This is particularly the case in emerging and developing markets, which currently impose few or no marketing restrictions, or struggle to implement those they have imposed, as governments seek to avoid lawsuits by powerful multinational tobacco corporations (Henriksen, 2012; Picasso, 2017). But despite the limited regulatory restrictions on tobacco firms' marketing practices in emerging and developing markets, according to Owen Bennett, who works as a tobacco analyst at the brokerage Jefferies, there appears to be a trend among emerging economies to increase taxes on the tobacco sector, resulting in a slowdown of tobacco consumption (Gerrard, 2017). Since the WHO (2015a) argues that raising taxes is the most effective way

to reduce tobacco consumption, increased global regulation could negatively affect future tobacco demand and thus represent a driver of change for the industry.

1.2.3. Lobbying

IBIS World (2018), a renowned market research firm, lists "economies of scale, [the] ability to effectively manage risk, [and to] successfully [negotiate] with regulator[s]" as the most relevant success factors for the tobacco industry. Whereas the successful risk management of tobacco firms is mainly characterised by their legal departments' effective prevention of lawsuits relating to their business practices, these firms go a step further, prioritising strategic interactions with officials and policy-makers. In many cases, tobacco firms have prepared ready-to-sign policy proposals for specific regulators. In 2017, the UK Serious Fraud Office began an investigation into British American Tobacco relating to allegations of bribery of politicians in at least four African countries, Burundi, Comoros, Kenya and Rwanda (Tobacco Atlas, 2018b). Grieve Chelva, an economist from Zambia (Financial Times, 2017), has noted that although most sub-Saharan countries have signed the FCTC, effective lobbying by tobacco firms has prevented them from fully enforcing it. Last but not least, starting as far back as the 1950s, tobacco firms have tried to create public uncertainty about the evidence for the health dangers of tobacco consumption by using "sophisticated public relations approaches to undermine and distort the emerging science" (Brandt, 2012). Figure 3 displays a summary of the various activities tobacco firms engage in to protect their business practices from additional regulation.

Figure 3: An overview of activities by the tobacco industry to undermine controls on their business practices

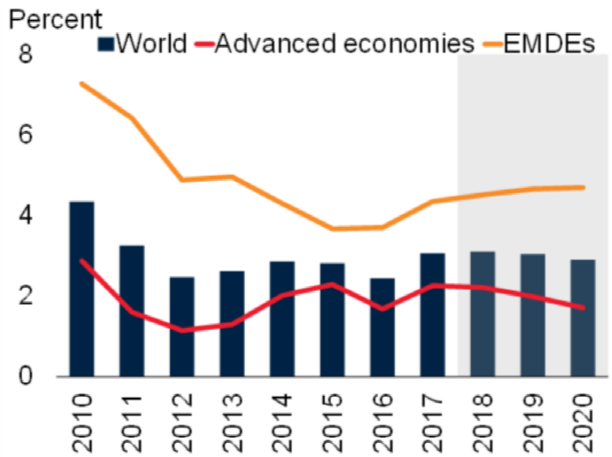


Source: Tobacco Atlas (2018)

1.3. ECONOMIC ENVIRONMENT: EMERGING MARKETS AND DEVELOPING ECONOMIES (EMDES)

A very strong economic factor driving the revenues of tobacco firms are sales in emerging markets and developing economies (EMDEs). The tobacco industry is increasingly targeting these primarily low- and middle-income countries, where the vast majority of smokers (more than 80%) live, and where education levels and health awareness are comparatively low (Tobaccofreekids, 2017). Furthermore, EMDEs generally present an attractive future outlook in terms of potential customers. They enjoy high levels of economic growth, exemplified by GDP growth rates (Figure 4) which are twice as high as in advanced economies. This GDP growth disparity is expected to continue during the coming years (World Bank, 2018).

Figure 4: Global GDP Growth Rates in Percentages



Source: World Bank (2018)

In addition to high GDP growth rates, EMDEs' populations are growing faster than those of developed markets, which translates into higher absolute numbers of potential tobacco firm customers. As economic development lifts more and more people within EMDE countries out of poverty, middle classes grow and disposable household income rises, which in turn leads to more money being available to be spent on tobacco products. However, increasing disposable income and population size are not the only reasons EMDEs are lucrative revenue drivers for tobacco firms. Prices of factory-made cigarettes are much lower in developing countries such as Zambia and Bangladesh (Tobacco Atlas, 2018). One reason is the comparatively low proportion of tax in cigarette prices in these countries (Lewis & Birt, 2017). But despite the apparent positive developments in EMDEs from a tobacco industry perspective, almost all EMDEs (with the notable exceptions of Indonesia and Taiwan) are parties to the Framework Convention on Tobacco Control, whose signatories promise to reduce tobacco use by, for instance, increasing taxes and imposing marketing restrictions. Nevertheless, many EMDE countries lack the capacity to effectively enforce regulations. However, recent tax hikes in some emerging markets have put significant pressure on tobacco sales (Gerrard, 2017). In summary, emerging and developing economies are crucial for the tobacco industry and offer both wide-ranging future growth opportunities and threats, and thus can be seen as a key driver when looking at their revenue streams.

1.4. SOCIAL ENVIRONMENT

1.4.1. BOYCOTTS: GENERAL

"A boycott is an act of voluntarily abstaining from using, buying, or dealing with a person, organization, or country as an expression of protest, usually for social or political reasons" (Elliott, 2018). There is a growing trend among colleges and universities in the United States to opt to become smoke- or tobacco-free. An analysis of campus newspapers by Seitz, Kabir, Greiner and Davoren (2018) suggests that among those surveyed and among those who voted on policy changes, there is support by most students and employees for tobacco- and smoke-free policies. An increasing number of large investors, including institutional investors such as banks, insurance companies, health care providers and pension funds, have boycotted the tobacco industry either by disinvesting current holdings or resisting future investments in tobacco stocks (Gulland, 2016). A study by Luo and Balvers (2017) reveals that the market capitalisation of investor-boycotted stocks of tobacco firms increased on average from US $27 million during the years 1963-1972 to nearly US $490 million during the years 2003-2012. This tremendous increase reflects the overall growing trend of consumers and investors boycotting the tobacco industry. In addition to decisions by investors and consumers, wealthy individuals are supporting global boycotts by providing financial resources. The Bill & Melinda Gates Foundation and Bloomberg Philanthropies have contributed more than US $225 million and US $600 million respectively since 2007. The financial power of these initiatives has helped to spur governments to implement further regulations and taxes on the tobacco industry. The combined power of consumers, investors and wealthy individuals is placing increasing pressure on the industry. This effect is amplified by the increasing power of social media; in the digital age, it is becoming easier to share information about boycotts and questionable practices and to motivate further supporters (Beck, 2018). Consequently, boycotts are a significant and growing risk for the tobacco industry and thus an important driver of change.

As a result of rising pressure by NGOs, investors and consumers, tobacco firms are increasingly being required to redress the impact their operations have on the environment and society. During the 20th century, most companies in this industry began to address these issues by committing themselves to corporate social responsibility (CSR) initiatives, which aim to improve firms' reputations. A recent analysis by McDaniel, Cadman and Malone (2016) indicates that almost all tobacco firms now dedicate substantial resources to developing and communicating CSR policies. The major focuses of these CSR policies are youth smoking, child labour and the environmental impact of tobacco farming. This

development shows that tobacco firms feel the need to respond, at least to a certain extent, to societal pressure, despite the difficulty of rapidly and effectively implementing these initiatives, as the following example relating to tobacco farming shows.

Tobacco farming involves an estimated 33 million people worldwide. As the tobacco plant is most successfully cultivated in subtropical climates, most farming takes place in emerging and developing economies, with China, India and Brazil the leading tobacco producing countries in 2016 (Statista, 2018). There are major health hazards associated with tobacco harvesting, such as green tobacco sickness and exposure to toxic chemicals, and these dangers are even greater for young workers or child labourers. Tobacco farming still relies on this younger work force. According to the United States Department of Labor (2016), there are currently 16 countries in which child labour and/or forced labour in tobacco harvesting has been documented. Globally operating NGOs such as Human Rights Watch and international organisations including UNICEF are closely monitoring the situation, working on initiatives to prevent the exploitation of children and encouraging governments to undertake protective measures (UNICEF, unknown date).

As Human Rights Watch (2017) points out, the tobacco industry has committed to protecting child workers on a global scale. The industry-wide Sustainable Tobacco Program encompasses more than 180 tobacco companies that have pledged to prohibit the exposure of child labourers to green tobacco within their supply chains. However, it is not entirely clear how those developments will impact tobacco companies. The use (or non-use) of child workers may have two major channels through which it affects the tobacco industry: reputation and costs. An analysis of shareholder proposals from Philip Morris, Imperial Brands, British American Tobacco and Japan Tobacco over the past 10 years carried out by our team shows no clear trend. Although the improvement of human rights standards in the industry is one of the more frequently addressed proposal topics, a low voting participation for resolutions relating to social, environmental and health-related matters indicates scant interest in tackling child labour. Nonetheless, although shareholder engagement has been unsuccessful so far, it is not unlikely that this will change in the future, as the tobacco industry faces stronger regulation.

To conclude, it seems the tobacco industry is more frequently subject to boycotts from a variety of groups ranging from investors and wealthy individuals to students and consumers. Next to criticism which addresses the negative health effects of smoking, more people tend to boycott the tobacco industry due to unethical manufacturing conditions. Therefore, it will be increasingly difficult for tobacco firms to

improve their reputations, and this is a trend that will only intensify in future, and thus change the industry.

1.4.2. BOYCOTTS: DIVESTMENT TREND

Divestment is the opposite of investment, and describes the process of selling assets for financial, political or social reasons. Over the past years a trend towards tobacco divestment has become more and more pronounced. An increasing number of institutional investors and financial actors are limiting their tobacco stock purchases, while others are stopping purchases and selling the tobacco stocks in their portfolios. This process has been spurred by the World Health Organisation, which established the Framework Convention on Tobacco Control and included the requirement that signatory governments refuse to invest in the tobacco industry (WHO, 2005). This encompasses government pension funds and sovereign wealth funds. Although non-governmental pension funds and other financial actors are not subject to this stricture, the list of pension funds that abstain from investing in tobacco stocks is growing, mainly for ethical reasons, and now includes financial giants AXA Group, BNP Paribas AM and Robeco. AXA took this step in 2016 as part of their responsible investment strategy, with BNP Paribas and Robeco following in 2018 for the same reasons (AXA, 2016; Financial News, 2018; Investment Europe, 2018). Beyond these three examples, a range of financial services companies have announced that they will divest from tobacco stocks. Furthermore, various banks, such as BNP Paribas and ABN Amro, do no longer offer credit to tobacco firms, indicating a clear trend towards ethical and responsible investment.

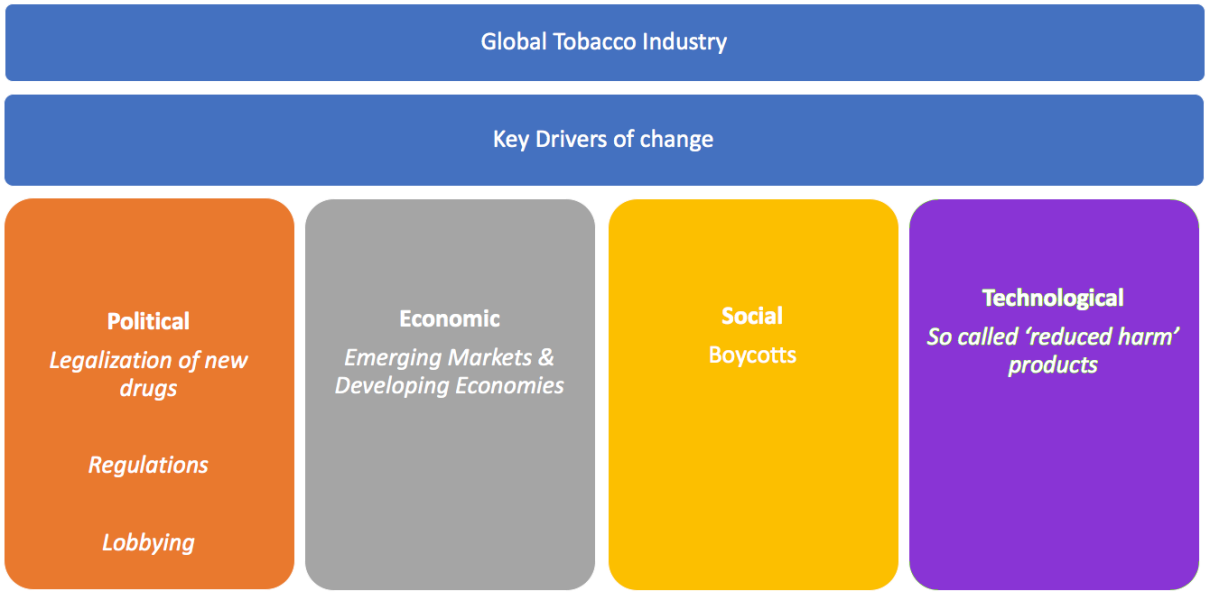
1.5. TECHNOLOGICAL ENVIRONMENT: SMOKE-FREE TOBACCO PRODUCTS

Vaping, “the use of e-cigarettes or other devices that let you breathe in nicotine (or other drugs) as vapour rather than smoke” (Cambridge Dictionary, 2018), has been characterised as a harm-reducing alternative to smoking cigarettes (Lewis & Birt, 2017). Although researchers do not yet know how much harm vaping causes to users, many smokers use it as an aid to smoking cessation. Even tobacco firms promote vaping as a substitute for smoking and some have said they plan to cease selling smoking products and focus exclusively on non-smoking products including e-cigarettes (Philip Morris International, 2018). A recent report on the consequences of e-cigarette use for public health by the National Academies of Sciences, Engineering, and Medicine states that vaping is likely to be less harmful than conventional cigarettes, but that there still is a lack of evidence to support this point (Consensus Study Report, 2018). The long-term health impacts of those relatively new non-smoking products remain unclear and are now the focus of a large research body (Hua, Talbot, 2016). Whereas vaping appears to have reduced the number of active

smokers in many countries, it has increased the number of young consumers. According to the U.S. Surgeon General (2016), the "electronic cigarette use by high school students grew 900% from 2011-2015". This dramatic surge is a logical development, given the recent introduction of e-cigarettes, and it brings with it the risk that young people will become addicted to nicotine, even at the low levels contained in e-cigarettes (Lewis & Birt, 2017). On the other hand, because a lower nicotine level implies less addictive potential, it is hard to predict the impact of the rise of e-cigarettes on the tobacco industry. Hence, the technological aspect of the analysis, alternative smoking products and e-cigarettes, is a crucial determinant of the future of the industry and a main driver of change.

In the preceding analysis we identified six key drivers of change in the global tobacco industry, which can be clustered by using a PEST framework. The political dimension comprises the following drivers: legalisation of illicit drugs, regulations, and lobbying; the economic dimension is mainly characterised by increases in disposable income in emerging markets and developing economies, and the social cluster is represented by boycotts as a key term for ethical boycotts, disinvestment, CSR developments, as well as child labour issues. Last but not least, the technological dimension of the PEST framework encompasses non-smoking products such as e-cigarettes. In the next section, we will apply these six key drivers of change in the context of three different scenarios, of which the first represents the "best case" for tobacco firms, the second constitutes a moderately worse case and the third carries the most severe consequences for the tobacco industry. Figure 5 summarises the key drivers.

Figure 5: Key Drivers of Change in the Tobacco Industry

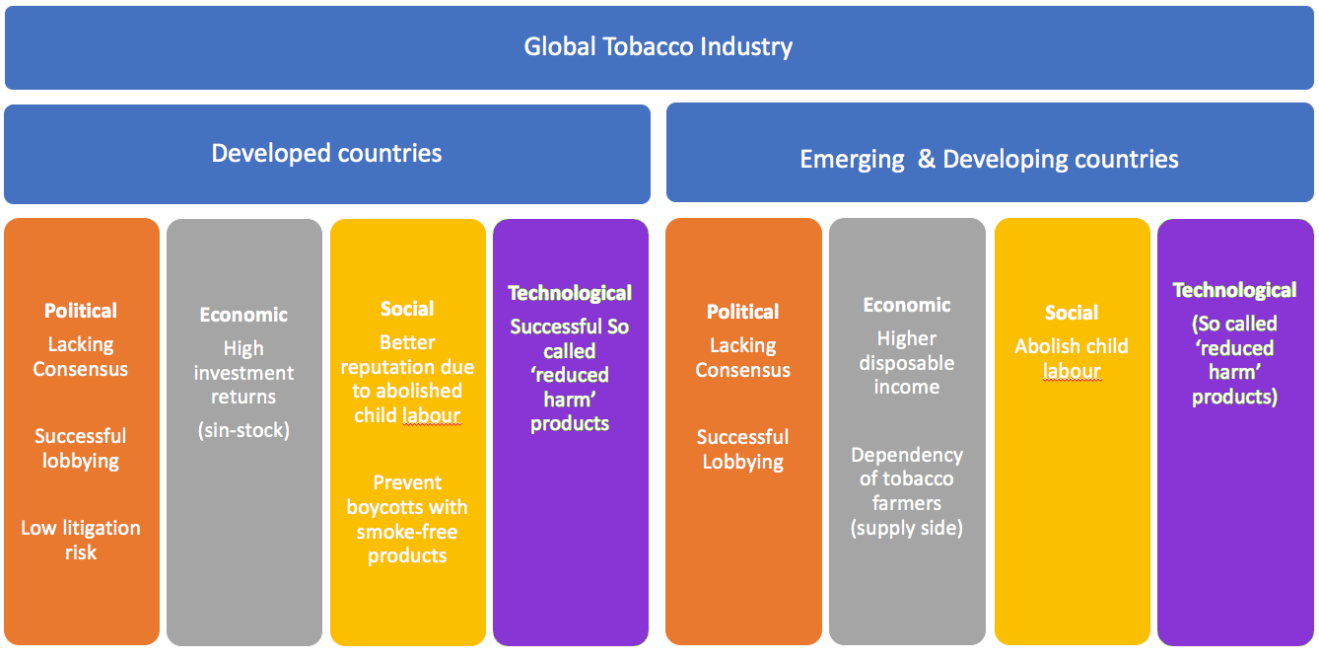


2. Scenarios

2.1. SCENARIO I: PAST PERCEPTIONS

In this scenario, we assume that tobacco firms' development will be relatively positive over the coming decades. In particular, this scenario expects that regulations on tobacco firms will not tighten further, that emerging and developing economies will become the main revenue-driving markets for tobacco products, and that social movements will have the same impact on the valuation of tobacco firms as they have had in the past: very little (Offen, Smith, & Malone, 2005). Consequently, this scenario represents the "best case" for tobacco firms under the circumstances we have identified in the extensive analysis above. Figure 6 summarises the key developments of this scenario.

Figure 6: Key Developments in Scenario I



POLITICAL ENVIRONMENT

First of all, tobacco firms benefit from the lack of political consensus in both developed and emerging markets. In Austria, for instance, in 2018 the parliament dropped a smoking ban in bars and restaurants, "despite a petition in its favour collecting 545,000 signatures" (The Guardian, 2018). In the coming decade, this scenario anticipates that such disagreements will decrease the risk for tobacco firms of any additional internalisation of costs on a global scale, too. As we describe below, in tobacco-producing countries policy-makers are willing to offer support for tobacco firms because of their positive impact on agricultural employment. In an increasingly globalised world, this is one of the few avenues for developing countries to obtain a competitive advantage, and their political leaders will be reluctant to increase regulations for the tobacco sector.

Furthermore, although there is a lack of consensus on the issue among developed countries, in jurisdictions that have legalised drugs such as cannabis, tobacco companies are expected to participate in the new business as well (Roberts, 2018). As political developments create new revenue drivers for the tobacco industry, they will continue to exploit existing loopholes in current regulations. For example, even though there are already many tobacco marketing restrictions in place, especially in developed countries, gaps still exist, such as package price reductions (Kasza et al, 2011).

With respect to developments in the regulation of tobacco firms, litigation risk is expected to be very low in developed and emerging countries alike. The appeal against a lengthy class-action suit in the Canadian province of Quebec in 2015 in which three global tobacco firms face fines of US $15 billion will, if successful, serve as a precedent in further litigation around the globe. The appeals to two courts, the Quebec Court of Appeal and the Supreme Court of Canada, are expected to last for three additional years (Tobacco Trial, 2018). Its failure would imply that other lawsuits have low odds of success, too. This will reduce the operational risk for tobacco firms and contribute to the industry's low cost of capital (Business Wire, 2018).

ECONOMIC ENVIRONMENT

Even though 181 parties have signed the WHO's Framework Convention on Tobacco Control (FCTC, 2017), and even though an increasing number of institutional investors including the Axa Group (2016) and BNP Paribas (Pionline, 2018) have announced plans to divest tobacco from their funds, the tobacco industry will continue to achieve strong results. According to Business Wire (2018), a Berkshire Hathaway

company, the earnings per share of Philip Morris International are forecasted to range between 8% and 11% in 2018, excluding a favourable currency effect. In general, tobacco firms are part of the "sin stocks" identified by Blitz and Fabozzi (2017) as historically outperforming the market in terms of returns. These abnormally high returns can be explained by the two quality factors of profitability and investment, rather than any litigation or reputation risk premium. As many investors shun tobacco stocks because of their bad ethical reputation, other investors recognise the same stocks as good investment opportunities and pursue the opportunity to earn high returns on them.

The most promising markets for tobacco products are developing and emerging markets, as disposable income has increased in these countries in recent years. In Congo, for example, smoking prevalence surged from 13.0% in 2003 to 43.1% in 2015, a more than threefold increase. Cameroon, Mali, Lesotho and Nigeria report similar growth rates (Tobacco Atlas, 2018). The increase in prosperity in these countries is not expected to halt in the near future, and tobacco companies' bottom lines benefit from the growing middle class in these markets. In addition to the demand-side factors, tobacco cultivation is a supply-side issue in the developing countries of sub-Saharan Africa, as many farmers continue to prefer planting tobacco over other crops, since they promise considerably higher and safer returns. Consequently, in order to support employment in their countries, policy-makers encourage farmers to work in the tobacco supply sector (Tobacco Control, 2015). From tobacco firms' perspective, their monopolistic buying power in the supply of tobacco production means that costs will remain low (The Conversation, 2014).

To sum up, this scenario postulates that tobacco stocks remain a lucrative investment tool in developed countries as they previously achieved high returns. In developing countries, tobacco firms enjoy low costs of production as many farmers depend on the tobacco business and represent cheap labour for the few but large tobacco firms.

SOCIAL ENVIRONMENT

The aforementioned cheap labour supply for tobacco companies may facilitate the ending of child labour in the production of tobacco, as such cheap labour may largely offset any potential increase in the cost of goods sold (COGS) resulting from overall higher wage costs after child labour has been banned. By effectively abolishing child labour practices, tobacco companies are likely to be able to stem public outcry over these practices. Moreover, this will help them to improve their reputation among both citizens and

policy-makers. In developed countries, tobacco firms are successfully reducing the risk of widespread boycotts of their products by committing to the abolition of smoking products such as cigarettes and switching to non-smoking products.

TECHNOLOGICAL ENVIRONMENT

From a tobacco industry perspective, this scenario suggests that the e-cigarette market will boom, especially in advanced economies. There it will specifically expand tobacco firms' consumer base among young people (Tobacco Atlas, 2018).

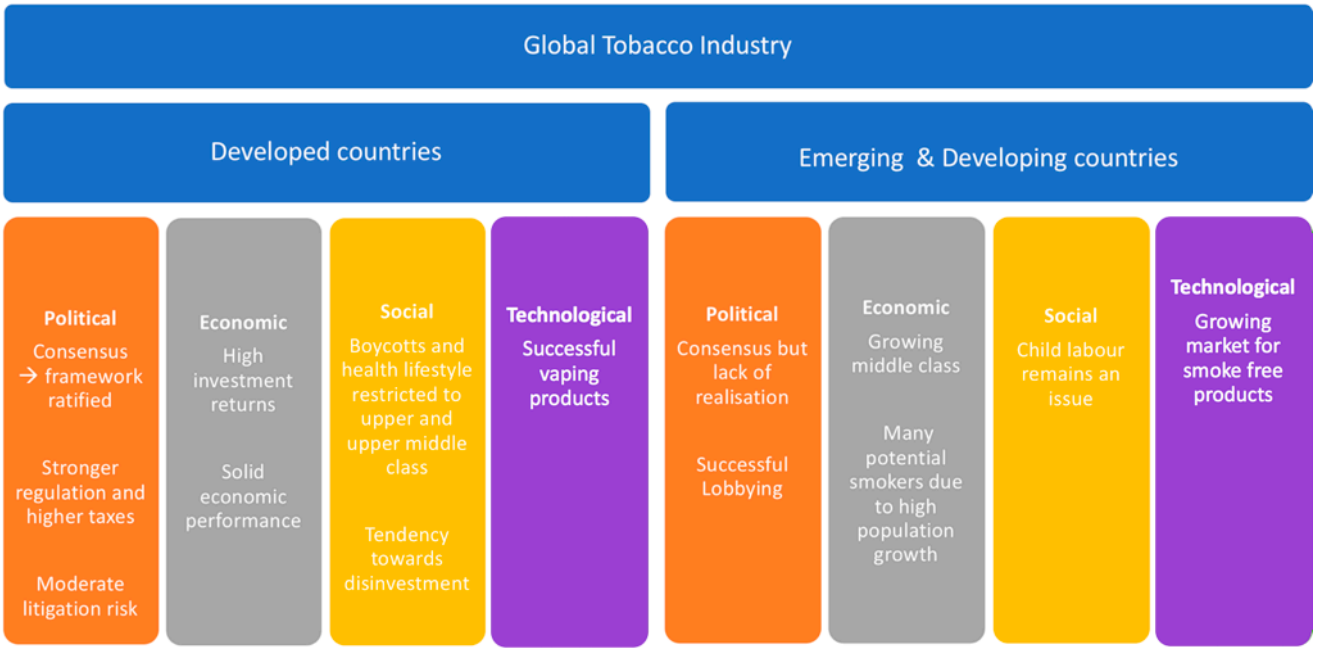
In conclusion, in Scenario I the key political, economic, social and technological drivers mentioned above cause revenues to increase, especially in emerging and developing countries, costs to remain low, and the cost of capital to remain low, too, in both advanced and developing countries (Business Wire, 2018).

Table 2: Main Assumptions in Scenario I

Scenario 1	2018-2022
Operating Revenue	Growth 3% p/y
COGS % Revenue	Decrease 1.5% p/y
SGA % Revenue	Decrease 1.5% p/y
WACC	Decrease 0.5% p/y
	2023-2032
Revenue growth	1.5% p/y
WACC	Equal to one in 2022
	Continual Value
Revenue growth	1.5% p/y
WACC	Equal to one in 2022

2.2. SCENARIO II: SMOKE ALARM

Figure 7: Key Developments in Scenario II



POLITICAL ENVIRONMENT

The majority of the advanced economies continue to pursue anti-tobacco regulations, led by trailblazers such as Australia and New Zealand, which rank among the countries with the most stringent restrictions on smoking and which have been praised for their efforts by the WHO (DW, 2017). Some emerging economies and less developed countries "enter the political stage", which noticeably increases the potential for global cooperation. Their efforts are supported by new evidence, especially from the emerging economies, that the number of tobacco-related deaths had been underestimated, and that e-cigarettes do not represent a healthier alternative to traditional cigarettes. Furthermore, research by health specialists, by economists and social scientists suggests that the externalities imposed on society, in the form of health problems from passive smoking, related costs and societal instability, are higher than previously estimated and that in some parts of the world smoking is a threat to a well-functioning society owing to high mortality rates among members of the work force in their most productive years (WHO, 2017). International consensus on how to reduce smoking through legislation is reached and a global policy framework is ratified. A large number of countries successively increase taxes, strengthen regulations and implement other anti-smoking policies. Advanced economies grant international funds to governments and approved NGOs to run anti-tobacco campaigns in the world's less developed regions.

Subsequently, the media acknowledges western governments' efforts to protect the health of citizens and limit tobacco-caused illness and death. This leads western media outlets to shift their focus to issues that are now regarded as more pressing, such as the lack of political action against climate change and the increasing disparities within western societies (Abraham, J., 2017; Johnston, I. 2017; OECD, 2015; Oxford Martin School, 2017). As multiple studies in the EU and the U.S. show, the media accurately reflect public opinion here, as the vast majority of the population is happy with the action taken by their governments to limit smoking. Political debate and regulatory efforts now focus on the previously mentioned issues that have recently claimed most media attention, as western liberal democratic governments direct their energies to fighting rising populism and nationalism at home (Goebel, N., 2018, Matthews, 2017).

However, while there is agreement on the framework's goals, the success of implementation in the emerging regions is mixed, as some governments do not show sufficient dedication or simply operate in too troubled an environment to act. Furthermore, effective lobbying by tobacco firms continues to be a factor in emerging economies (Various, 2017).

Successful lawsuits serve as precedents and raise the cost of business for tobacco companies, which are increasingly obliged to pay substantial compensation. However, the impact of successful litigation is too often limited to the developed countries.

Cannabis is legalised by an increasing number of countries. Many western countries acknowledge that the fight against marijuana has been unsuccessful and instead focus efforts on tackling organised crime and harder drugs while opening the market for the medical or recreational use of cannabis. Examples of this shift include a number of US states, and Canada, which became the second country in the world and the first G7 nation to fully legalise the use of marijuana (Sapra, 2018). Other developed nations follow in an attempt to capture tax revenues associated with the cannabis industry and have a regulatory influence on the products being grown and sold.

ECONOMIC ENVIRONMENT

The social, cultural, economic and political conditions in less developed countries vary considerably, leading to divergent outcomes around the world. The main drivers of the economic situation of developing economies, which tobacco companies may be able to exploit for their own benefit, are their economic performance and population growth.

The economic outlook is strong, as Asian countries in particular experience strong economic growth that causes the middle class to expand rapidly and disposable income to rise. Currently home to 30% of the global middle class, the Asian countries will host 64% by 2030 (Rohde, 2012). As the world's population grows inexorably, the rise is proportionally greater in the emerging than the developed countries, which increases the number of potential smokers. The United Nations (2017) projects that the world population will be 9.8 billion in 2050, driven by high fertility rates in Asia and particularly Africa, where about half the nations are expected to have doubled their population by 2050.

However, the growth in the economy and the population does not directly translate into a greater number of smokers and higher cigarette sales in all developing economies. Governmental anti-smoking efforts lead to stagnation or even slight declines in the percentage of smokers in South East Asia and in parts of Latin America. Vietnam is an example of a territory imposing successful anti-smoking measures. While it currently has a tax rate on tobacco below the world average and far below that in fellow ASEAN countries, its government and civil movements have supported tax increases aimed at reducing the high number of smokers and smoking-related deaths (Vietnamnet, 2018). In contrast, many governments in sub-Saharan Africa have failed to institute restrictions and laws against smoking. As the percentage of smokers in African countries is fairly low, tobacco companies have run concerted and successful marketing campaigns (Owolegbon-Raji, A, 2018). This development is reinforced by the massive population growth that many African countries are experiencing. Although the profit margins earned by tobacco firms in developing countries remain comparatively small, the sheer numbers of smokers leads to an increase in revenues.

SOCIAL ENVIRONMENT

Although marketing restrictions have been put in place to stop the advertisement of traditional as well as e-cigarettes, and anti-smoking campaigns are run, the population share of smokers in the advanced economies has decreased only slightly. However, there is a change in the composition of smokers. There

is a downward trend among members of the upper and upper-middle class, caused by a tendency towards a healthier lifestyle and fitness movements (Euromonitor, 2017). Yet smoking boycotts are not supported by society as a whole, and the negative trend in higher-income groups is offset by a stable or slightly increasing share of smokers in the expanding lower-middle and lower classes (Wan, 2017; Barbeau, E.M., Leavy-Sperounis, A., Balbach, E.D., 2004).

The tendency towards disinvestment continues. Following banks such as BNP Paribas and ING, asset managers such as Robeco and NN Investment Partners and insurers such as AXA and Aegon, other financial actors ban tobacco stocks and other tobacco-related investments from their portfolios (Financial News London, 2018; Investment Europe, 2018). While the Framework Convention on Tobacco Control established by the WHO has been a spur to disinvestment at government level, corporate asset management firms generally characterise their decision as part of their commitment to responsible investment.

Child labour remains an issue for tobacco firms. Although most tobacco companies have committed to banning child workers from handling green tobacco within their value chain, industry-sponsored programmes do little to lessen child labour as they do not address the deeply entrenched problems faced by tobacco farmers. As Hefler (2018) points out, those programmes, which are part of the tobacco industry's corporate social responsibility initiatives, do not address the cycle of poverty for farmers that is the result of industry-driven low leaf prices and unfair contracts. As most farming communities are locked into their current situation there is little room for improvement, and child labour will be curbed only slightly, thereby enabling the tobacco industry to maintain low production costs. However, as the public observes no significant improvement despite to the industry's stated commitment to the Sustainable Tobacco Program, reputational issues remain. The lack of action and persistent negative reputation reinforces trends toward disinvestment and greater regulation.

TECHNOLOGICAL ENVIRONMENT

A change in the nature of smoking products occurs following the introduction of e-cigarettes and other alternative smoking products, as these new products are adopted by new, younger smokers (BBC, 2017). Although e-cigarette's vapour differs from conventional smoke, its use does not have a significant impact on smoking cessation figures, and thus it remains an alternative for many smokers in the advanced economies.

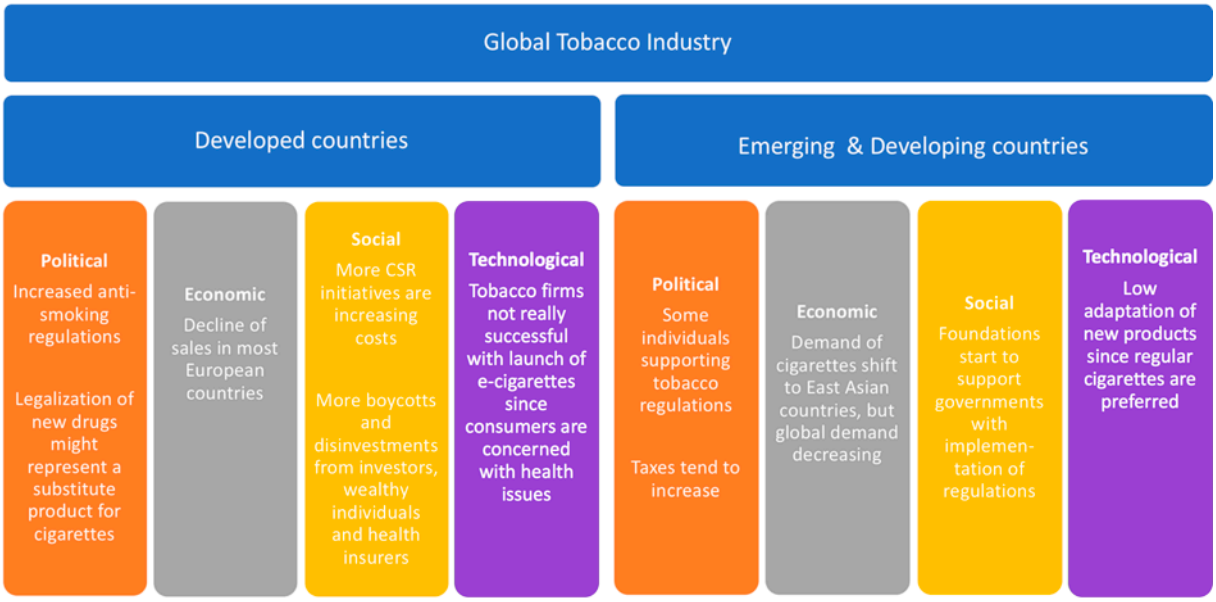
Table 3: Main Assumptions in Scenario II

Scenario II	2018-2022
Operating Revenue	Growth 1.5% p/y
COGS % Revenue	Increase 1.5% p/y
SGA % Revenue	Decrease 1% p/y
WACC	Increase 2% p/y
	2023-2032
Revenue growth	1% p/y
WACC	Equal to one in 2022
	Continual Value
Revenue growth	1% p/y
WACC	Equal to one in 2022

All in all, in Scenario II the key political, economic, social and technological drivers mentioned above cause overall revenues to increase, with decreases in developed countries and increases in developing countries. Simultaneously, total costs increase in both advanced and developing countries. The cost of capital also increases moderately, since the volatility of free cash flows from tobacco stocks increases, which results in a higher risk premium demanded.

2.3. SCENARIO III: WHERE THERE IS SMOKE, THERE IS FIRE

Figure 8: Key Developments in Scenario III



POLITICAL ENVIRONMENT

With respect to the political and legal environment, regulations and restrictions have increased, especially in developed countries. Recently, the Dutch Supreme Court ruled that people are no longer allowed to smoke in any public hospitality room, not even in designated smoking areas. Dutch justices ruled that allowing people to smoke in these areas conflicted with the agreed-upon terms in the WHO Framework Convention on Tobacco Control (2003). Echoing this decision, many more European countries further increase anti-smoking regulations between 2020-2030. However, following strong lobbying efforts by the tobacco industry, standardised European Union legislation will be avoided, using the argument that it goes against the autonomy of member states. Some European countries, such as Germany, persist with relatively lenient anti-smoking regulations compared to those in neighbouring countries. Additionally, the Food and Drug Administration (FDA, 2018) in the U.S. has tried to reduce the amount of nicotine present in cigarettes. The scenario anticipates, that, although the aim of cutting the amount of nicotine in cigarettes by 97% in the next few decades will unsuccessful, the FDA still manages to significantly reduce the amount of nicotine in the upcoming years.

In emerging markets, policy success is rather mixed. Some major markets such as China have decided to focus heavily on increasing the welfare and health of their citizens. President Xi Jinping's wife, Peng

Liyuan, joined the Chinese Association on Tobacco Control in 2009. Xi, a former smoker, is head of state for life and thus in a position to enact meaningful reform in tobacco regulations, as attested by various academic sources (e.g. Hu et al. (2010); Levy et al. (2014)). During Xi's lifelong presidency, tobacco control will become one of the focal points of his overall public health policy.

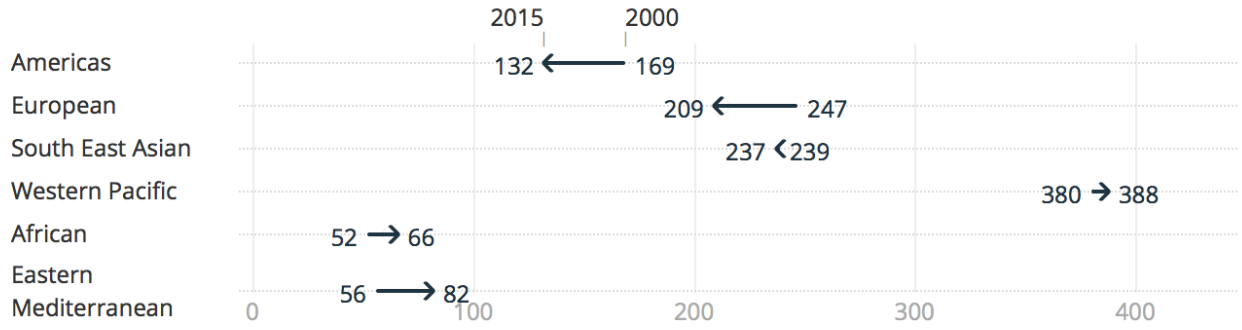
Other governments are rather unsuccessful in their attempts to substantially decrease smoking in their jurisdictions. Many African governments still actively promote tobacco farming in a way similar to the one noted by Hu and Lee (2015). Tobacco firms are able to use the economic importance of their operations in these countries to persuade politicians not to adopt strong tobacco controls. Furthermore, emerging countries in particular are wary of attracting lawsuits by multinational tobacco firms in response to marketing restrictions or stronger anti-smoking regulations.

Nevertheless, it seems that the net effect of these policy interventions will prevent the growth potential in these markets from materialising. Although attempts to restrict the supply side of the tobacco industry, for example by regulating distribution and marketing, are regularly prevented by industry lobbying, more and more developing countries are increasing taxes on cigarettes. Thus tobacco consumption is restricted by reducing the incentive on the demand side. More countries follow this path, as the additional taxes also bring additional financial resources for their respective governments.

ECONOMIC ENVIRONMENT

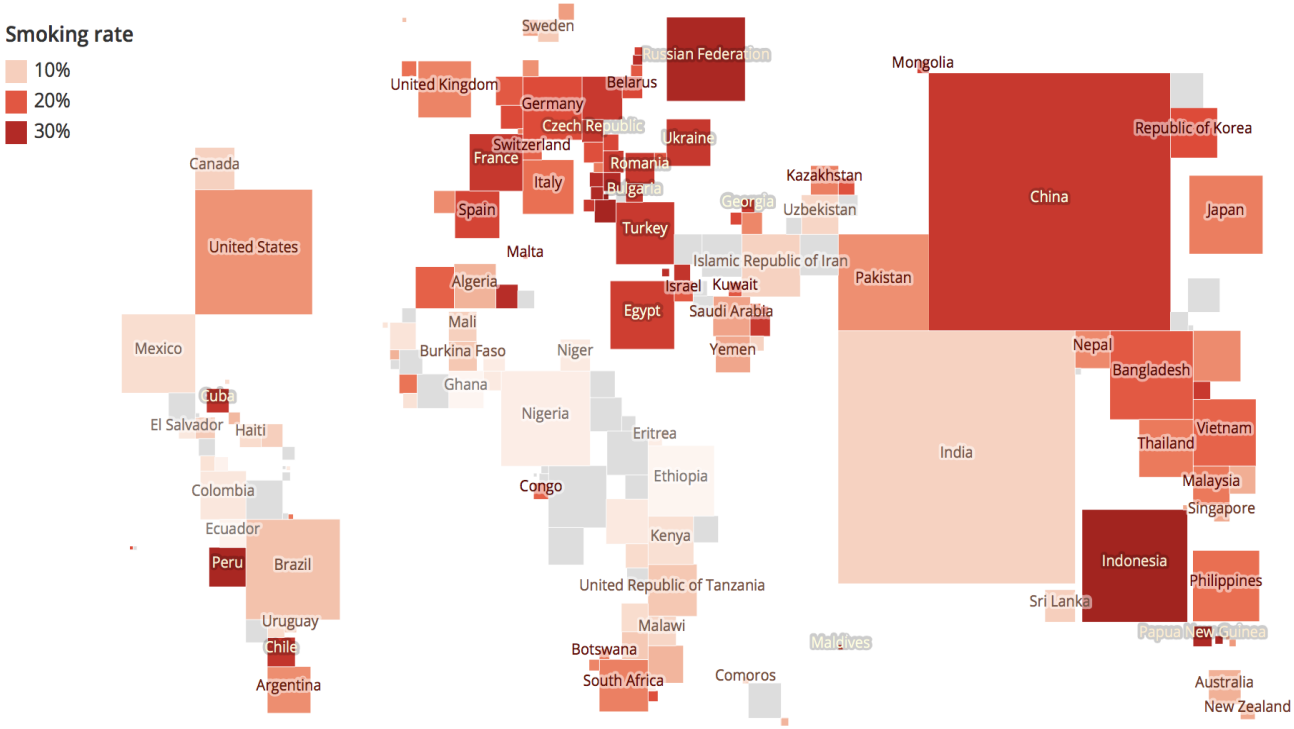
From a macroeconomic perspective, tobacco smoking appears to be declining in almost all parts of the world except for Africa, the western Pacific, and the Eastern Mediterranean region, which can be seen in Figure 9.

Figure 9: Evolution of number of smokers in millions, 2015 vs 2000, by WHO regions



Source: WHO (2016)

Figure 10: Daily tobacco smoking rate as % of the population aged 15+ years in 2016 (Squares sized according to population size)



Source: WHO (2016)

Mostly owing to political and social factors, high-income countries are generally making faster progress in controlling tobacco use. Although European countries still account for a large share of the world's current tobacco consumption, which is graphically represented in Figure 10, the large European middle class is increasingly prioritising a health-conscious lifestyle. Thus the smoking rate in Europe is expected to further decline, which in turn decreases local demand for cigarettes.

Growth in East Asian and low-income countries will not be sufficient to make up for lost demand elsewhere. It is expected that by 2021, global cigarette volume will decline by 8.2%, according to the Campaign for Tobacco Free Kids (2017).

SOCIAL ENVIRONMENT

Investors are increasingly choosing to divest from tobacco firms. Ioannou and Serafeim (2015) found that security analysts are becoming increasingly concerned with CSR criteria in their valuations, while Blitz and Fabozzi (2017) showed that, when controlling for the Fama & French factors, there is no real positive alpha associated with "sin stocks". Given the increasingly negative reputational effects of holding tobacco stocks, many investors will be persuaded to trade these stocks out of their portfolios. This finding is in line with the study of Luo and Balvers (2017), who argue that investors in the tobacco industry are exposed to an additional risk factor and thus require additional compensation. Since this risk factor is based on litigation risk and excise taxation, chances are high that the attached risk will increase in the future, given recent developments showing a global increase in taxes on cigarettes.

The fact of investors requiring higher compensation in turn increases the future financing costs of the company. The increase in cost of capital leads to less profitable investment opportunities for tobacco firms, which further hampers growth. However as also described by Ansar, Caldecott and Tilbury (2013) in research on the fossil fuel industry, the abovementioned rise in societal awareness is a lot more significant. Walter (2008) argues that firms in the financial sector should care about their reputation since it materially impacts their valuation. An example of reputational risk is involvement in industries that do not align with societal norms. As society's values turn against tobacco, these firms are obliged to follow suit to protect their value. Tobacco firms' increasing focus on CSR policies may mean that those companies see their value threatened due to their non-compliance with societal norms, in particular because of public outcry and multiple shareholder proposals relating to unethical production and child labour. Abandoning unethical production practices will lead to increased COGS in future, and it is not certain that technological advancements can compensate the loss of cheap labour.

TECHNOLOGICAL ENVIRONMENT

From a tobacco industry perspective, e-cigarettes have not caught on as well as tobacco companies had hoped. The FDA's rejection in 2018 of certain health claims for Philip Morris' heat not Burn product was a significant move in overall FDA policy (Edney, 2018). This resulted in similar verdicts for most products in this category. The inquiry of UK lawmakers into e-cigarettes was only the start of a movement that resulted in UK e-cigarette regulations that are as stringent as controls on smoking tobacco (Financial Times, 2017). Initially, the FDA planned to implement the regulation in this segment of the U.S. market in 2022, but court cases such as a recent one by various public health groups has further increased the trend towards strong e-cigarette controls (Raymond & Mincer, 2018). As a result, these products are not likely to create significant business growth for tobacco firms.

Although these products did not completely fail, it turns out that most of their users choose them because they were not able to quit tobacco altogether (ASH, 2017). As this trend continues, the growth in e-cigarettes will most likely cannibalise traditional tobacco sales. The relatively unsuccessful introduction of this product line is mostly due to the fact that an increasing amount of research shows significant health hazards associated with the use of these types of products. Later research has supported claims made by studies by Lerner et al. (2015) and Hess (2017) on the potential health damage of these products. It can be concluded that tobacco controls and global trends have significantly decreased the number of smokers worldwide. Global cigarette volumes sales continue to decrease, with the result that there are markedly fewer smokers than at the start of the century. Therefore, it is increasingly less common for youngsters to start smoking, as children of non-smoking parents are significantly less likely to smoke (Simons-Morton et al., 2001).

To conclude, in Scenario III the key economic, political, social and technological drivers mentioned above cause overall revenues to decrease and total costs to increase in both advanced and developing countries in the long run. The cost of capital also increases significantly, since the volatility of free cash flows from tobacco stocks increases, which results in a higher risk premium demanded due to a higher litigation risk.

Table 4: Main Assumptions of Scenario III

Scenario III	2018-2022
Operating Revenue	Decrease 4% p/y
COGS % Revenue	Increase 1.5% p/y
SGA % Revenue	Increase 0.5% p/y
WACC	Increase 5% p/y
	2023-2032
Revenue growth	Negative 0.5 % p/y
WACC	Equal to one in 2022
	Continual Value
Revenue growth	Negative 0.5 % p/y
WACC	Equal to one in 2022

3. Valuing Tobacco Stocks Using Scenario Analysis

3.1. VALUATION OUTCOMES

Based on the narratives in our scenarios, we subsequently made assumptions which we could use as inputs in our valuation model. This model is a version of the one developed by Koller, Goedhart and Wessels (2010) which we adjusted to make it useable in a scenario analysis study. Their model is highly regarded and extensively used by both practitioners as well as academics. It is based upon a three stage discounted cash flow model in which the final stage represents the computation of a terminal value that is discounted back to today. The specific methodology that we use to reach our valuation results, as well as the complete list of assumptions that we made and the entire output, can be found in an appendix to this report. In addition to valuing these scenarios, we also included a form of sensitivity analysis to illustrate how prone our results are to the inputs in the valuation model. We decided to include the four largest non-state owned companies that make up "Big Tobacco" in the model. In this section we will briefly discuss the key conclusions from this valuation exercise.

First of all, it is important to note that all three scenarios have similar implications for all firms in our valuation tool. We decided to take this approach as we do not have enough detailed firm-specific knowledge to allow us to make a useful distinction among them. Additionally, as the aim of this report is to obtain an idea of the value for the stocks of the tobacco industry as a whole rather than provide insights into which firm is best prepared to deal with the identified risk factors, adjusting the scenarios to each specific company is beyond the scope of our research.

Based on the three abovementioned scenarios and the assumptions for the key value drivers associated with each scenario, we arrived at the following valuations for each firm (see Table 5). When we compare our valuations with current market prices as well as with the market prices on the last trading day of 2017, we can make two clear observations. Firstly, it is evident from this table that the stock prices for each of these four firms have decreased significantly since the start of 2018. To us, it seems that the market has incorporated some of the earlier mentioned risk factors in the valuation of tobacco stocks. Secondly, based on our data, we argue that the market currently expects a future scenario that is somewhere in between our second and third scenarios, given the current market prices for these stocks

for three of the four firms, with the stock of Japan Tobacco as an outlier. Based on the data, we do not expect a sudden market crash, but rather a continuous decline in the market capitalisation of tobacco firms in the long run. However, the quantitative analysis of this report only takes into account the current product portfolio of the four major companies. It is possible that additional revenue streams from non-tobacco products or cost efficiencies from the introduction of new technologies may compensate for the decline in profitability based on the sale of tobacco-related products.

Table 5: Outcomes of Scenarios I, II and III

	Scenario I	Scenario II	Scenario III	22.06.2018	29.12.2017
British American Tobacco	£ 50.60	£ 35.34	£ 21.29	£ 39.11	£ 50.18
Imperial Brands	£ 92.57	£ 49.15	£ 20.75	£ 27.28	£ 31.66
Philip Morris	$ 125.37	$ 89.48	$ 57.37	$ 80.19	$ 105.65
Japan Tobacco	¥7972.31	¥ 5,308.56	¥ 3,247.77	¥ 3,214.00	¥ 3,631.00

As we are not experts on the Japanese tobacco industry and lack specific information about Japan Tobacco, we are not able to provide a rigorous explanation for why its current position diverges from the other three of the "Big Four" tobacco firms. Nevertheless, reports such as that by Uranaka and Shimizu (2018) that indicate that there is currently fierce competition in the Japanese tobacco market. In particular, authors mention a battle between Philip Morris and Japan Tobacco for a share of the Japanese e-cigarette market. An explanation for Japan Tobacco's significantly different values may be found in such a direction.

3.2. SENSITIVITY ANALYSIS

In addition to the general valuation for these four firms based on the assumptions that we derived from our scenario analysis, we also conducted some additional sensitivity analysis of these results. In this sensitivity analysis, we show how prone our results are to the assumptions that we made on our three biggest value drivers (weighted average cost of capital, the future revenue growth, and costs development) by adding a high and a low estimate for each, while keeping all other variables equal. Moreover, we included two additional, and very extreme, scenarios in this sensitivity analysis. One of them is our "Thank You for Smoking" analysis, in which we show what would happen to the valuation of the tobacco stocks if we were to apply the high estimates for each of these three key value drivers to the positive Scenario I. The other shows the valuation of the stocks under what we call the "Doomsday"

scenario, in which we apply low estimates for each of these three key value drivers to the bad news Scenario III. In the main body of this paper, the sensitivity results for the two extreme outcomes as well as for Philip Morris are shown.

Table 6: Extreme "Thank You for Smoking" Scenario

Thank You for Smoking	Price	22.06.2018	29.12.2017
British American Tobacco	£ 163.79	£ 39.11	£ 50.18
Imperial Brands	£ 393.91	£ 27.28	£ 31.66
Philip Morris	$ 331.72	$ 80.19	$ 105.65
Japan Tobacco	¥35,435.01	¥ 3,214.00	¥ 3,631.00

The table above displays the outcomes of the extreme "Thank You for Smoking" scenario, which takes the positive Scenario I as a base line and changes the three key value drivers in a way that is positive to the valuation of the stocks. First of all, this scenario assumes that yearly revenues will grow between 2023-2032 with five percentage points more than the number that we present in our basic Scenario I. In addition, we decreased the yearly cost percentages in terms of revenue in the period 2018-2022 by five percentage points. Finally, the discount rate during our entire period is decreased by two percentage points. In this extreme scenario one can clearly see that the stock values of these firms absolutely skyrocket compared to the current price that they command on the market. While this is an unlikely scenario, it once again illustrates how great the financial incentive is for tobacco firms to increase the number of people who smoke around the world.

Table 7: Extreme "Doomsday" Scenario

Doomsday	Price	22.06.2018	29.12.2017
British American Tobacco	£ 12.36	£ 39.11	£ 50.18
Imperial Brands	£ -	£ 27.28	£ 31.66
Philip Morris	$ 28.94	$ 80.19	$ 105.65
Japan Tobacco	¥ 1,026.21	¥ 3,214.00	¥ 3,631.00

The table above presents the outcomes of the extreme Doomsday scenario. This one takes our negative Scenario III as a base line and changes the three key value drivers in a way that is negative to the valuation of the stocks. First of all, this scenario assumes that yearly revenues will decrease between 2022-2032 by five percentage points more than the number that we took in our basic Scenario III. In addition, we increased the yearly cost percentages in terms of revenue in the period 2018-2022 by five

percentage points. Finally, the discount rate during our entire period is increased by two percentage points. In this Doomsday scenario, it is immediately clear that there is no value included for Imperial Brands. The reason for this is that we obtained a negative value for this stock as an outcome to our valuation tool. As stocks cannot trade for such a value in the market, and as this model indicates that the assumptions were potentially too negative for Imperial Brands in this case, we chose to limit its loss to a value of zero. Additionally, extreme losses for each of the other three companies can be seen. As with the extreme "Thank You for Smoking" scenario, we are not necessarily arguing that this is the most likely thing to happen. However, in the case that severe anti-tobacco action is undertaken, this scenario shows that investments in these stocks will be heavily affected in a negative way.

Table 8: Outcomes of WACC Sensitivity Analysis for Philip Morris

Philip Morris	Scenario I	Scenario II	Scenario III
High	$ 180.35	$ 123.82	$ 74.37
Medium	$ 125.37	$ 89.48	$ 57.37
Low	$ 96.39	$ 70.88	$ 47.76

In Table 8, the outcomes of the WACC sensitivity analysis of Philip Morris are illustrated. In this analysis, the medium row represents the figures of our general valuation. For the high estimates, we kept all assumptions equal except for the WACC, which we decreased by two percentage points. For the low estimates, we did exactly the same thing but then increased this same WACC by two percentage points compared to the base scenarios. One can observe that the valuations of the Philip Morris stock are quite sensitive to changes in assumptions regarding the discount rate. This finding may not be surprising, as this is typically the case in a discounted free cash flow model. However, as Philip Morris, like the other firms that we valued, has a relatively low cost of capital, this effect is even stronger in this case. For instance, it is interesting to note that a decrease in the WACC by two percentage points in the first scenario will imply a discount rate of slightly higher than 4%, which explains why the upward adjustment effect is much stronger in this case than the downward one.

Table 9: Outcomes of Long-Term Revenues Sensitivity Analysis for Philip Morris

Philip Morris	Scenario I	Scenario II	Scenario III
High	$ 172.63	$ 118.32	$ 71.24
Medium	$ 125.37	$ 89.48	$ 57.37
Low	$ 94.84	$ 70.70	$ 48.24

In Table 9, the outcomes of the long-term revenue growth sensitivity analysis of Philip Morris are shown. In this analysis, the medium row represents the values of our general valuation. For the high estimates, we kept all assumptions equal except for the yearly revenue growth between 2023-2032, which we increased by five percentage points. For the low estimates, we did exactly the same thing but then decreased this same revenue growth by five percentage points compared to the base scenarios. It should be noted that the values of this stock change significantly after this adjustment to our long-term revenue growth assumptions. Nevertheless, it is evident that the stock is still exposed to downward risk even after this rather drastic upward revenue adjustment in Scenario III. As with the WACC sensitivity analysis, there is more upward adjustment in the high estimates than downward adjustment in the low estimate. This is due to the compounding effect that increases the nominal revenue growth from year to year in the high estimate, but limits the nominal decline from year to year in the low estimate.

Table 10: Outcomes of Short-Term Sensitivity Analysis Costs for Philip Morris

Philip Morris	Scenario I	Scenario II	Scenario III
High	$ 156.51	$ 115.37	$ 72.06
Medium	$ 125.37	$ 89.48	$ 57.37
Low	$ 87.76	$ 58.39	$ 38.45

In Table 10, we present the outcomes of the short-term costs sensitivity analysis for Philip Morris. In this analysis, the medium row represents the values of our general valuation. For the high estimates, we kept all assumptions equal except for the yearly costs as a percentage of revenue between 2018-2022, which we decreased by five percentage points. For the low estimates, we did exactly the same thing but then increased this same cost figure by five percentage points compared to the base scenarios. In this case, it is clear that the results seem to be slightly less sensitive than in the other two scenarios. Especially in the first one, the high estimate is now clearly lower than in the two other sensitivity analyses. Additionally, it should be noted that even in the case of the first scenario, the low scenario is lower than the original value of the second one. This implies that even in the most positive scenario, a significant increase in

the costs for the tobacco firms can have a clear impact. In this case, the results are not as strongly biased upwards, as the compounding effect does not support it in such a way.

We would like to refer readers seeking a more technical explanation of our valuation exercise to the appendix of this paper. In this appendix, we describe the entire tool including all the assumptions that we made to arrive at our results. It also provides a manual to the dashboards that are included with this report. We have also included the additional output that we generated when conducting the valuation study, such as the sensitivity analysis for the other stocks.

3.3. LIMITATIONS AND FURTHER RESEARCH

Our research developed three scenarios with the aim of identifying three potential future states of the tobacco industry, which we based on an extensive literature review and corporate valuations. However, we acknowledge that the quality of our research would benefit greatly from incorporating even more diverse viewpoints into our research. One way this could be done would be to organise a large-scale event in which the Delphi method is used to obtain additional insights from a diverse body of experts. This approach was recommended to us during the workshop at Cardano; however, a lack of resources meant we were unable to undertake this initiative.

Additionally, there are some limitations in the results from the valuation tool that were obtained during our research. First of all, a lack of specific expertise on individual tobacco companies meant we were unable to vary our assumptions for each of these companies. Although we believe that our assumptions give a reasonable picture of the factors to which an average company in the tobacco industry is exposed, being able to adjust the assumptions based on the specific situation of each company would increase the accuracy of our tool. Additionally, the outcomes of any valuation exercise are only as good as the assumptions on which the valuation is based. We sincerely believe that our inputs in the model are both reasonable and moderate. Nevertheless, we think that further micro-economic research into how the key value drivers are influenced by our identified drivers of change could further enhance these inputs.

Last but not least, further research could aim to identify specific probabilities for the individual scenarios, as well as at the size of the impact any key driver of change might have under the different scenarios.

4. Concluding Comments

The aim of this paper is to gain a better understanding of the intrinsic value of tobacco stocks in the light of all recent potential risk factors by using the technique of scenario analysis. As a starting point, we conducted an industry analysis using a PEST framework. We were able to identify various drivers of change that we subsequently clustered according to the four categories in this framework.

Based on these drivers of change and an extensive literature review, we began to develop three scenarios that reflect potential future states of the industry. One could be classified as positive. The second is more neutral and the third one is more negative. These scenarios are the result of a mental exercise in which we tried to come up with three possible ways in which current trends could evolve if they were extrapolated into the future. After developing these scenarios, we were able to make modest and reasonable assumptions on how we expected that certain key value drivers would develop under each scenario.

Using these assumptions as key input variables in our adjusted version of the Koller et al. (2010) model, we reached various conclusions on the state of the tobacco industry. Our research shows that the price of each tobacco stock that we investigated has decreased substantially during the first half of 2018. The findings indicate that the market currently values these companies at a price that is associated with an expectation that the future world will resemble an outcome that lies in between the second and third of our scenarios. However, our sensitivity analysis also indicates that the outcomes of these scenarios themselves are very prone to changes in one of the three key value drives.

Therefore, it is clear from this study that there is plenty of downside risk associated with the materialisation of one of the more negative scenarios. Thus we would argue that investors in these firms are exposed to significant potential downside risk. Based on our analysis, it seems that tobacco firms are unlikely to continue their widely documented superior historical performance. Consequently, we stress that investors should be aware of the exposure to this downside risk, in addition to the ethical concerns that are associated with investing in tobacco.

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Appendix: Valuation & Sensitivity Analysis

ABBREVIATIONS USED

COGS – Cost of Goods Sold

SGA – Selling, General, and Administrative Expenses

OCA – Other Current Assets

PPE – Property, Plant, and Equipment

WACC – Weighted Average Cost of Capital

EBITA – Earnings Before Interest, Taxes, and Amortization

INTRODUCTION

The aim of this report is to present the outcomes of scenario analysis performed on four major global tobacco companies: Japanese Tobacco International, Philip Morris International, Imperial Brands plc, and British American Tobacco. The document describes the methodology used for the valuation, data sources and the assumptions behind each of the considered scenarios.

DATA SOURCES

All the data that we used in this report are accessible via widely used databases. The source of the historical financial data used in this report for the valuation of each of the companies is from the FactSet database. The WACC is estimated using information from the FactSet, Bloomberg, Damodaran Online NYU Stern, and Reuters Finance databases.

METHODOLOGY

Our model is based on the valuation tool that accompanies the book *Valuation: Measuring and Managing the Value of Companies* by Koller et al. (2010) of McKinsey & Company, and is considered the standard guide for corporate valuation by both practitioners and academics. Our model works in two ways. Firstly, it draws from historical data; secondly, the valuation is influenced by our assumptions regarding future developments, which can be found in Table 1 later in this document. However, since this model is not developed to be used in a scenario analysis setting in the way that we conducted our research, we had to extend upon it to make it suitable for the needs of our project. We did this by increasing the number

of future scenarios that we could enter in this model. As the past is fixed for every firm, we did not need to change this for our analysis.

The historical data that is being used by the valuation model covers the past 10 entire financial years (2008-2017). We use a 10-year window as we consider it to be representative of the average performance of the tobacco companies under consideration. More specifically, we use historical data for certain income statement, statement of changes in equity and balance sheet items in our model. Additionally, various off-balance sheet items are used in the valuation. Examples include the average and year-end number of shares outstanding, as well as the current WACC of these firms.

We estimated the WACC by calculating the debt/equity ratios for each firm based on FactSet data. Consequently, to estimate the cost of equity for these companies, we used the yield on 10-year government bonds in each company's domestic country to estimate the risk-free rate from Bloomberg, Damodaran Online NYU Stern's equity risk premium and Reuters Finance's beta estimates for these firms. Reuters Finance estimates these betas by making use of monthly returns on trailing 5-year prices regressed against the S&P 500. To estimate the pre-tax cost of debt for each firm, we used the yield of maturity for an approximately 10-year outstanding corporate bond. For the after-tax cost of debt, we used the average effective tax rate from the most recent years available (up to five years) that we retrieved from Reuters Finance.

Based on historical performance over the past decade and the expected industry outlook, we created the three scenarios discussed in the main body of this paper. Each of the scenarios varies with respect to the values assigned to variables, which are the forecast drivers. The details regarding the assumptions made for of each of the scenarios and values of the forecast drivers are presented in a later paragraph. These assumptions are based on extrapolations of trends into the future and are supported by the narratives of each scenario in the main body of this text. The summary and comparison of the scenarios can be found in the valuation outcomes section at the end of this document.

As we look from this industry from a macro perspective, it is important to note that these three scenarios are the same for all the companies, meaning that the same set of assumptions for Scenario I, Scenario II and Scenario III is applied to all four tobacco firms. We can imagine that some firms are better suited to respond to certain market trends than others. Since the aim of this report is not to evaluate tobacco stocks on an individual basis but at an industry level, evaluating trends on a micro level is beyond the

scope of our research. Furthermore, the assumptions for each of the scenarios are fixed for the forecast of the first four financial years (2018-2022). Separate assumptions are made for values of the forecast drivers for the years 2023-2033. Similarly, each of the scenarios has different expectations regarding the terminal value after 2033, which is calculated using the perpetuity growth approach. Consequently, the model uses a three-stage discounted cash flow model with a terminal value and constant growth rate in the final year.

SCENARIO I

2018-2022

Scenario I is the most optimistic of all the settings considered. It assumes growth of operating revenue by 3% per year, and a decrease in COGS and SGA expressed as a percentage of revenue by 1.5% per annum. Other operating expenses are expected to constitute 0.1% of yearly revenue for the whole projected period.

Variables pertaining to the operating cash holdings, inventories, accounts receivable, accounts payable, OCA and OCL expressed as a percentage of revenue are assumed to be equal to the average of the past 10 financial years. As the operating revenue is expected to grow, the net PPE is assumed to grow accordingly at a slighter lower rate than revenues, being 2% per year. The depreciation, net increase in other operating assets and nonoperating income are expected to correspond to the average of the past 10 years. The WACC is anticipated to decrease at 0.5% per year, while the dividends as % of earnings and the tax rate are expected to equal the past decade's average.

2023-2033

The expected revenue growth and the EBITA margin increase for years 2023-2033 are between 1.5-2% per annum and 0.5%, respectively. Consequently, the cash tax rate, closing net PPE as a percentage of revenues, cumulative goodwill and WACC are assumed to have values equal to those in the year 2022. Other invested capital expressed as a percentage of revenues is set as equal to average for the years 2018-2022.

Continuation Value

The continuation value is calculated based on perpetuity growth methodology, hence assumptions about two input variables are needed. The revenue growth is expected to be 1.5% per year and the WACC is set as equal to the one in the year 2022.

SCENARIO II

2018-2022

Scenario II is the "middle ground" scenario and can be thought of as the most conservative set of assumptions applied to the valuation model. It assumes growth of operating revenue of 1.5% per year followed by 1.5% increase in the COGS to revenue ratio. The proportion of SGA to revenue is anticipated to decrease at 1% per annum and other operating expenses stay constant at 0.1% of revenue.

Variables such as operating cash, inventories, accounts receivable, accounts payable, OCA and OCL expressed as a percentage of revenues are assumed to be equal to the average of the past 10 years. The ratio of net PPE to revenues is expected to increase by 1% per year. The depreciation, increase in other operating assets and nonoperating income is anticipated as equal to the average of the past 10 years. The WACC is deemed to increase by 2% per year while dividends expressed as a percentage of earnings and tax rate are forecasted to an equal average of the past decade.

2023-2033

The revenue growth for the decade between 2023 and 2033 is estimated at 1% per annum. Adjusted EBITA margin, cash tax rate, closing net PPE as a percentage of revenue, cumulative goodwill and WACC are assumed to equal their respective values for the year 2022. Other invested capital is expected to equal the average of values for the years 2018-2022.

Continuation Value

The revenue growth used for calculation of the continuation value is equal to 1% per year and the WACC is set as equal to its value from the year 2022.

SCENARIO III

2018-2022

Scenario III represents the most pessimistic outlook for the tobacco industry. Operating revenues are expected to decrease at a rate of 4% per year, while the COGS and SGA are anticipated to increase by 1.5% and 0.5% per year, respectively. Other operating expenses are assumed to remain constant at 0.1% of revenue.

The ratio of operating cash, inventories, accounts receivable, accounts payable, OCA and OCL to revenues is assumed to equal the average of the past 10 years. The net PPE as a percentage of revenue and depreciation as a percentage of net PPE are deemed to increase at a rate of 1% per annum. The net increase in other operating assets and nonoperating income are set as equal to the average of the past decade. As this is the most pessimistic scenario, the WACC for tobacco companies is estimated to increase by 5% per year. Dividends as a percentage of earnings and tax rate are assumed to stay equal to the average of the past 10 years.

2023-2033

The revenue growth of tobacco companies in the years 2023-2033 is assumed to have a value of negative 0.5% per year and the adjusted EBITA margin is expected to shrink by 0.5% per annum. The cash tax rate, closing net PPE as a percentage of revenues, cumulative goodwill and WACC are set as equal to their respective values in the year 2022. Other invested capital is same as the average of values for this variable for the years 2018-2022.

Continuation value

The revenue growth beyond the year 2033 is set at a rate of negative 0.5% per year and the WACC is equal to that in the year 2022.

SENSITIVITY ANALYSIS

In addition to the main analysis of the scenarios based on the assumptions mentioned in the previous section, we also conducted some additional sensitivity analysis. The aim of the sensitivity analysis is to show how much the results depend on certain key assumptions. To illustrate this, we decided to show some quite dramatic changes in three different categories: revenue growth, cost of goods sold and

general administrative expenses, and the discount rate. In this section we will briefly explain how we changed these drivers in each case while keeping all other things equal. Furthermore, we created one additional situation in which these three drivers have a significant positive development, which we call "Thank You for Smoking", and a situation in which everything goes south for the tobacco industry, which we named "Doomsday". The output for the sensitivity analysis is presented below the regular scenario analysis output discussed in the previous section.

Revenue growth

For revenue growth, we based our sensitivity analysis on varying the revenue growth figures in the second stage of our free cash flow discount model. This is to illustrate how different revenue growth figures can influence the valuation of stocks. As differences in policy or social developments in the beginning of our forecast can have a significant impact on revenue growth in this period, in our revenue sensitivity analysis, the high estimate is characterised by a revenue growth that is 5 percentage points higher than the one in each scenario in the period from 2023-2032. Regarding the low estimate, this is based on a valuation in which we assume revenue growth that is 5 percentage points lower than the one in each scenario during this period.

Cost of goods sold/general administrative expenses

In the model, both cost figures are estimated by taking them as a percentage of the net revenue. With our sensitivity analysis regarding these factors, we want to illustrate the influence that they have on the valuation of tobacco stocks. As changes in regulations and social norms can have a rather drastic effect on the costs for these firms, we decided to project the sensitivity analysis on the first stage of our discounted free cash flow model. As a result, the high estimate for each scenario in the cost sensitivity analysis has been determined by lowering the yearly cost percentage in terms of revenue in the period from 2018-2022 by 5 percentage points. For the low scenario, we increased this figure by 5 percentage points during the same time frame. Please note that this led to a negative stock price in some cases. However, as this is not possible, we capped the losses at zero.

WACC

A crucial part in a discounted cash flow model is the discount factor used to convert the value of future cash flows in a current price. Therefore, we wanted to illustrate the sensitivity of our results to our assumptions about this discount factor by showing how different assumptions regarding the WACC can influence the results. In the high estimate, we decided to decrease the WACC in each scenario by two

percentage points during the entire valuation period. This was done to reflect potential decreases in perceived riskiness of these stocks. Additionally, for the low estimate we increased the WACC by two percentage points to reflect the impact that a potential increase in the demanded risk premium for holding these stocks can have.

Extreme outcomes

In addition to the abovementioned sensitivity analysis, we also developed two very extreme outcomes to illustrate what would happen to these firms in the most ideal or negative cases. In this calculation, the first set of outcomes that we included, named “Thank You for Smoking”, reflect a scenario in which Scenario I is strengthened by a high estimate in each category. Furthermore, we included another outcome which we named “Doomsday”, to illustrate a Scenario III in which we took the low estimates for each category. Like our results in the cost calculations, these outcomes reflected negative values. We decided to limit these losses to a maximum share price of zero.

COMPARISON OF SCENARIOS

The table below presents the assumptions underlying each of the scenarios and values prescribed to respective forecast drivers.

Table 1. Comparison of assumptions underlying different scenarios

	Scenario I	Scenario II	Scenario III
Forecast Driver	**2018-2022**		
Operating Revenue	Growth 3% p/y	Growth 1.5% p/y	Decrease 4% p/y
COGS % Revenue	Decrease 1.5% p/y	Increase 1.5% p/y	Increase 1.5% p/y
SGA % Revenue	Decrease 1.5% p/y	Decrease 1% p/y	Increase 0.5% p/y
Other Op. Exp.: % Revenue	0.1% p/y	0.1% p/y	0.1% p/y
Op. Cash: % Revenue	Average of past 10 years	Average of past 10 years	Average of past 10 years
Inventories: % Revenue	Average of past 10 years	Average of past 10 years	Average of past 10 years
Acc. Receivable: % Revenues	Average of past 10 years	Average of past 10 years	Average of past 10 years
Acc. Payable: % Revenues	Average of past 10 years	Average of past 10 years	Average of past 10 years
OCA: % Revenues	Average of past 10 years	Average of past 10 years	Average of past 10 years
OCL: % Revenues	Average of past 10 years	Average of past 10 years	Average of past 10 years
Net PPE as % Revenues	Increase 2% p/y	Increase 1% p/y	Increase 1% p/y
Depreciation: % Net PPE b/f	Average of past 10 years	Average of past 10 years	Increase 1% p/y
Other Operating Assets Net Increase	Average of past 10 years	Average of past 10 years	Average of past 10 years
Nonoperating Income (Expense)	Average of past 10 years	Average of past 10 years	Average of past 10 years
Special (pre-tax) Income (Expense)	Average of past 10 years	Average of past 10 years	Average of past 10 years
Extraordinary Items (Expense)	Average of past 10 years	Average of past 10 years	Average of past 10 years
WACC	Decrease 0.5% p/y	Increase 2% p/y	Increase 5% p/y
Dividends % Earnings	Average of past 10 years	Average of past 10 years	Average of past 10 years
Tax Rate	Average of past 10 years	Average of past 10 years	Average of past 10 years
	2023-2033		
Revenue growth	1.5% p/y	1% p/y	Negative 0.5 % p/y
Adjusted EBITA Margin	Increase 0.5% p/y	Equal to one in 2022	Decrease 0.5 % p/y
Cash Tax Rate	Equal to one in 2022	Equal to one in 2022	Equal to one in 2022
Closing net PPE % Revenues	Equal to one in 2022	Equal to one in 2022	Equal to one in 2022
Other invested capital as % revenues	Average of 2018-2022	Average of 2018-2022	Average of 2018-2022
Cumulative Goodwill	Equal to one in 2022	Equal to one in 2022	Equal to one in 2022
WACC	Equal to one in 2022	Equal to one in 2022	Equal to one in 2022
	Continuation Value		
Revenue growth	1.5% p/y	1% p/y	Negative 0.5 % p/y
WACC	Equal to one in 2022	Equal to one in 2022	Equal to one in 2022

Please note that in calculating the averages we left out some outliers, such as Imperial Brands paying dividends of more than 200% net earnings during 2016. As practices such as these are not sustainable, they do not give a good indication of future behaviour.

VALUATION OUTCOMES

The table below presents the valuation outcomes for each of the companies under consideration under a given scenario and its most recent share price. The values are displayed in the currency of the stock exchange at which the respective company is listed. These tables include the sensitivity analysis that we discussed above, as well as the two extreme outcomes.

Table 2. Valuation outcomes under different scenarios

Japan Tobacco	Scenario I	Scenario II	Scenario III
High (WACC -2% points)	¥15,358.75	¥ 9,558.95	¥ 5,258.80
Medium (assumptions)	¥ 7,972.31	¥ 5,308.56	¥ 3,247.77
Low (WACC +2% points)	¥ 5,383.86	¥ 3,730.73	¥ 2,454.96

Japan Tobacco	Scenario I	Scenario II	Scenario III
High (Long-Term Revenue +5% points)	¥11,585.98	¥ 7,414.37	¥ 4,230.34
Medium (assumptions)	¥ 7,972.31	¥ 5,308.56	¥ 3,247.77
Low (Long-Term Revenue -5% points)	¥ 5,686.57	¥ 3,971.58	¥ 2,620.61

Japan Tobacco	Scenario I	Scenario II	Scenario III
High (Short-Term COGS & SGA -5% points)	¥11,636.65	¥ 8,262.83	¥ 4,928.26
Medium (assumptions)	¥ 7,972.31	¥ 5,308.56	¥ 3,247.77
Low (Short-Term COGS & SGA +5% points)	¥ 3,530.65	¥ 1,745.40	¥ 1,233.19

Philip Morris	Scenario I	Scenario II	Scenario III
High (WACC -2% points)	$ 180.35	$ 123.82	$ 74.37
Medium (assumptions)	$ 125.37	$ 89.48	$ 57.37
Low (WACC +2% points)	$ 96.39	$ 70.88	$ 47.76

Philip Morris	Scenario I	Scenario II	Scenario III
High (Long-Term Revenue +5% points)	$ 172.63	$ 118.32	$ 71.24
Medium (assumptions)	$ 125.37	$ 89.48	$ 57.37
Low (Long-Term Revenue -5% points)	$ 94.84	$ 70.70	$ 48.24

Philip Morris	Scenario I	Scenario II	Scenario III
High (Short-Term COGS & SGA -5% points)	$ 156.51	$ 115.37	$ 72.06
Medium (assumptions)	$ 125.37	$ 89.48	$ 57.37
Low (Short-Term COGS & SGA +5% points)	$ 87.76	$ 58.39	$ 38.45

Imperial Brands	Scenario I	Scenario II	Scenario III
High (WACC -2% points)	£ 159.81	£ 80.30	£ 31.24
Medium (assumptions)	£ 92.57	£ 49.15	£ 20.75
Low (WACC +2% points)	£ 64.66	£ 35.64	£ 15.96

Imperial Brands	Scenario I	Scenario II	Scenario III
High (Long-Term Revenue +5% points)	£ 136.11	£ 69.84	£ 27.87
Medium (assumptions)	£ 92.57	£ 49.15	£ 20.75
Low (Long-Term Revenue -5% points)	£ 64.78	£ 35.87	£ 16.13

Imperial Brands	Scenario I	Scenario II	Scenario III
High (Short-Term COGS & SGA -5% points)	£ 145.51	£ 93.34	£ 46.00
Medium (assumptions)	£ 92.57	£ 49.15	£ 20.75
Low (Short-Term COGS & SGA +5% points)	£ 28.34	£ -	£ -

Comment: Scenario II and Scenario III yield negative share price for Imperial Brands

British American Tobacco	Scenario I	Scenario II	Scenario III
High (WACC -2% points)	£ 71.74	£ 48.70	£ 27.74
Medium (assumptions)	£ 50.60	£ 35.34	£ 21.29
Low (WACC +2% points)	£ 39.00	£ 27.92	£ 17.59

British American Tobacco	Scenario I	Scenario II	Scenario III
High (Long-Term Revenue +5% points)	£ 69.73	£ 53.99	£ 26.51
Medium (assumptions)	£ 50.60	£ 35.34	£ 21.29
Low (Long-Term Revenue -5% points)	£ 38.21	£ 32.28	£ 17.85

British American Tobacco	Scenario I	Scenario II	Scenario III
High (Short-Term COGS & SGA -5% points)	£ 66.08	£ 54.57	£ 29.42
Medium (assumptions)	£ 50.60	£ 35.34	£ 21.29
Low (Short-Term COGS & SGA +5% points)	£ 31.90	£ 21.68	£ 11.59

Table 3. Valuation outcomes under extreme scenarios

Thank You for Smoking	Price	22.06.2018	29.12.2017
British American Tobacco	£ 163.79	£ 39.11	£ 50.18
Imperial Brands	£ 393.91	£ 27.28	£ 31.66
Philip Morris	$ 331.72	$ 80.19	$ 105.65
Japan Tobacco	¥35,435.01	¥ 3,214.00	¥ 3,631.00

Doomsday	Price	22.06.2018	29.12.2017
British American Tobacco	£ 12.36	£ 39.11	£ 50.18
Imperial Brands	£ -	£ 27.28	£ 31.66
Philip Morris	$ 28.94	$ 80.19	$ 105.65
Japan Tobacco	¥ 1,026.21	¥ 3,214.00	¥ 3,631.00

Figure 1. Valuation outcomes for Japanese Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (JPY)

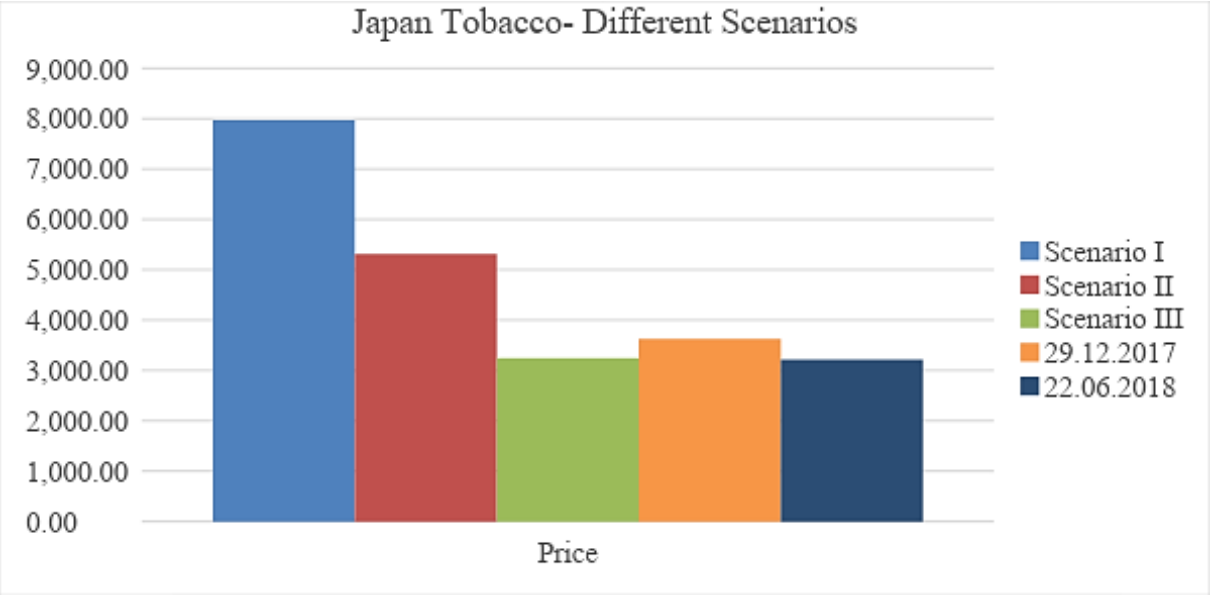


Figure 2. Valuation outcomes for WACC sensitivity analysis for Japanese Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (JPY)

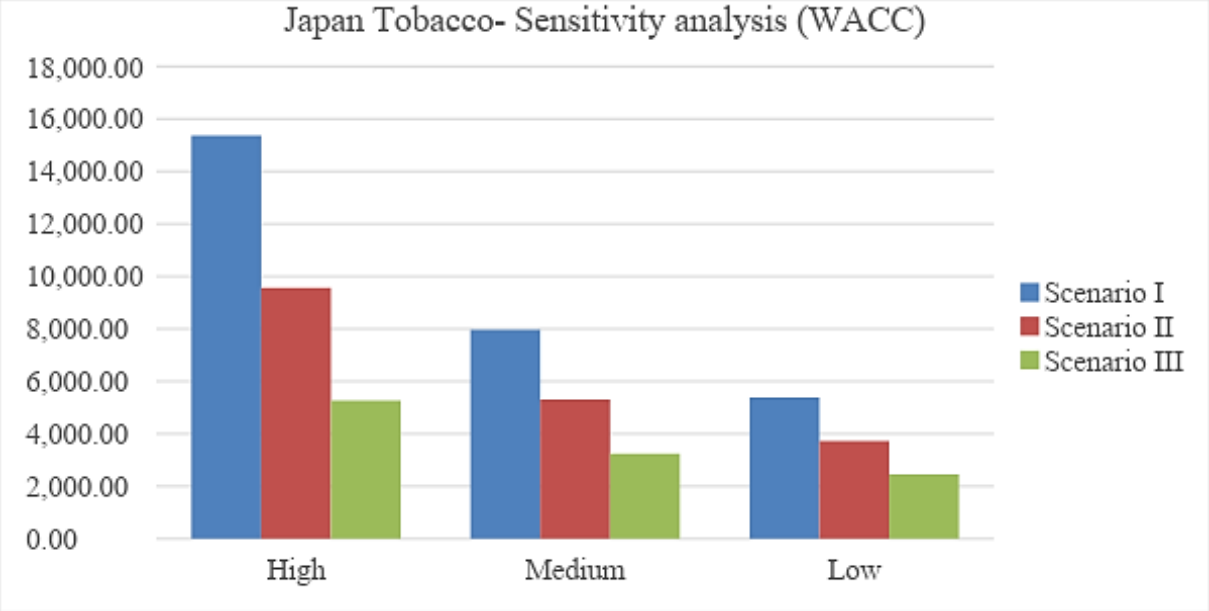


Figure 3. Valuation outcomes for Long-Term Revenue sensitivity analysis for Japanese Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (JPY)

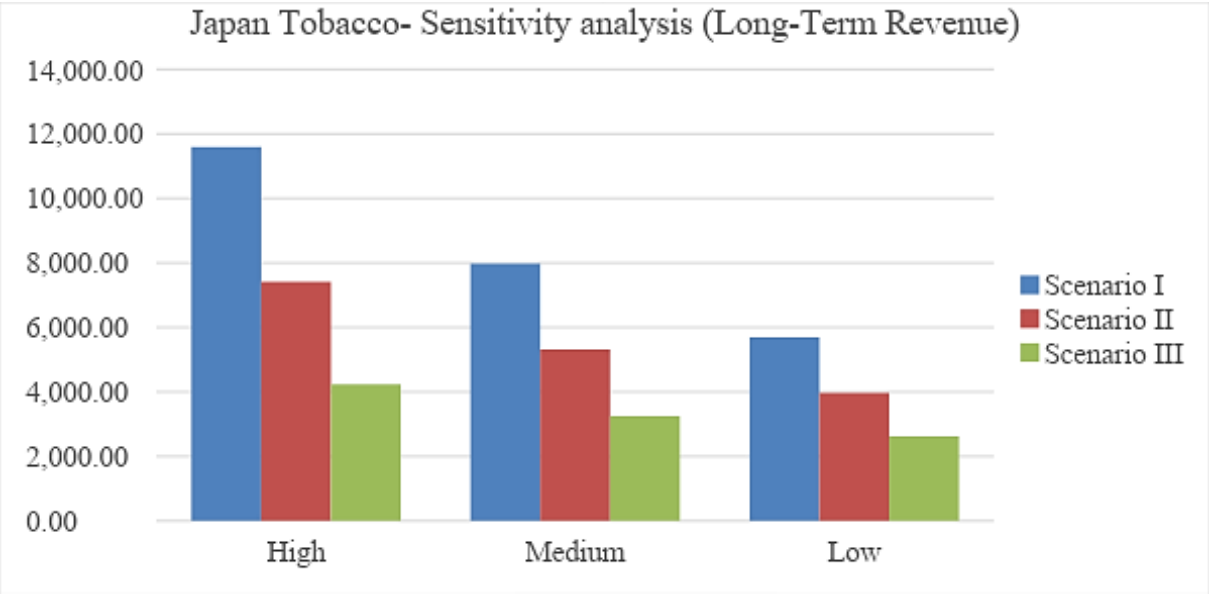


Figure 4. Valuation outcomes for Short-Term Costs sensitivity analysis for Japanese Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (JPY)

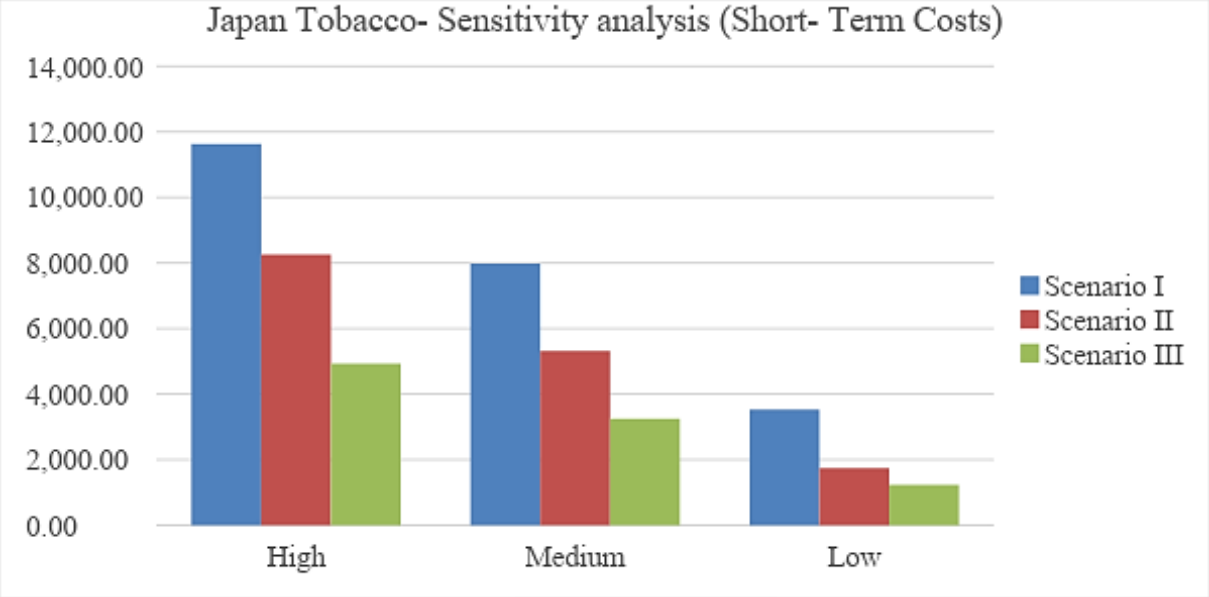


Figure 5. Valuation outcomes for Philip Morris

Graph displays valuation outcomes for companies in the currency of their stock exchange (USD)

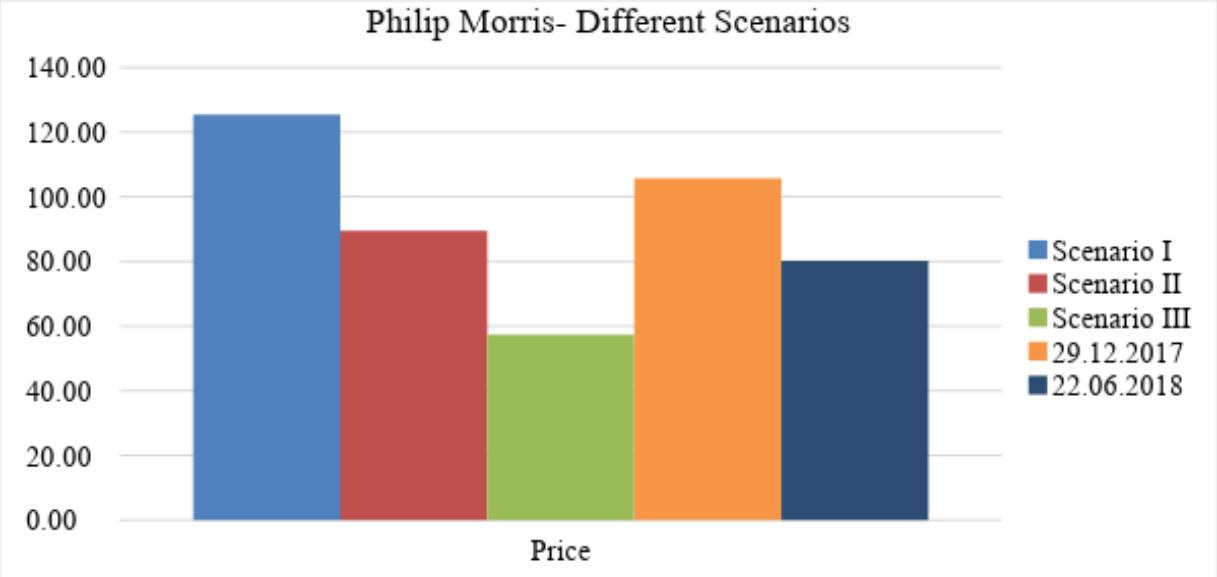


Figure 6. Valuation outcomes for WACC sensitivity analysis for Philip Morris

Graph displays valuation outcomes for companies in the currency of their stock exchange (USD)

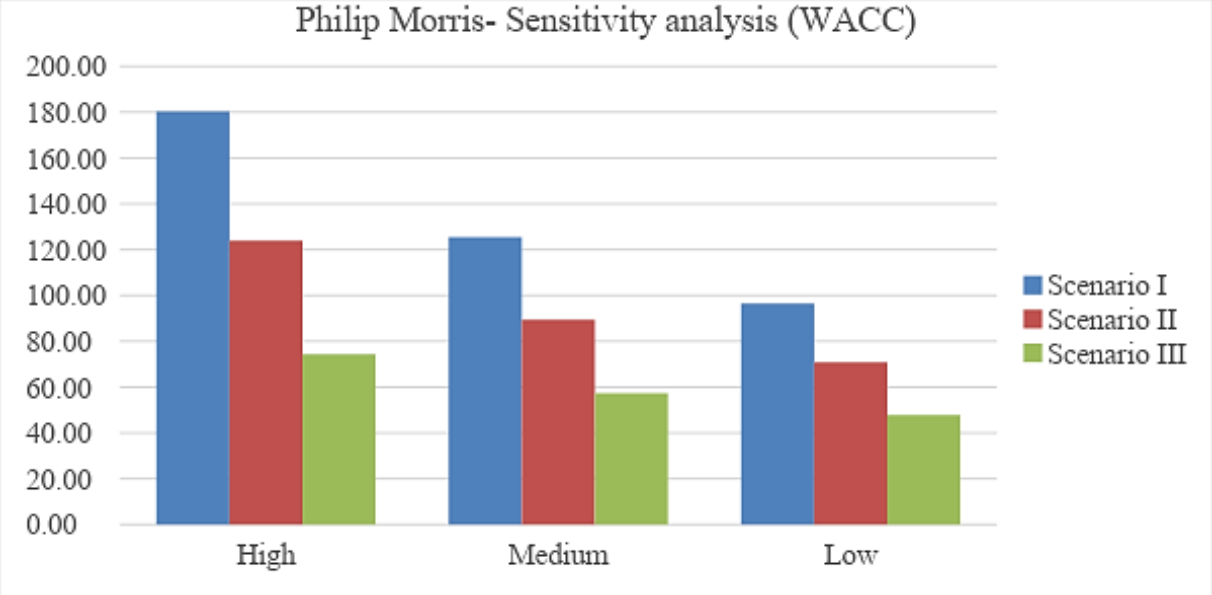


Figure 7. Valuation outcomes for Long-Term Revenue sensitivity analysis for Philip Morris

Graph displays valuation outcomes for companies in the currency of their stock exchange (USD)

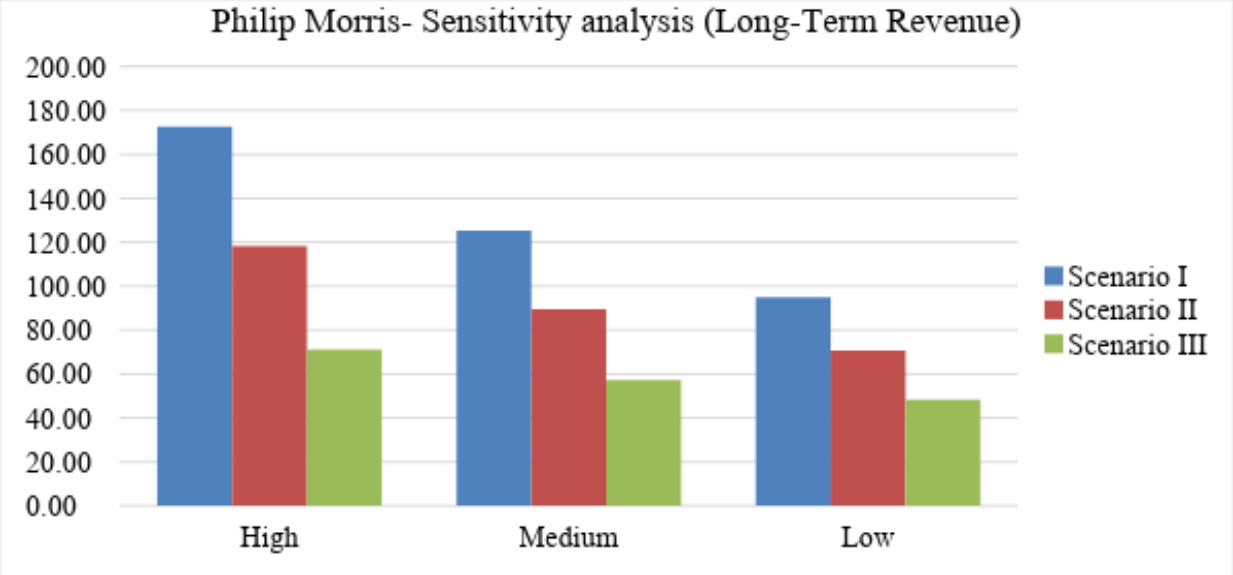


Figure 8. Valuation outcomes for Short-Term Cost sensitivity analysis for Philip Morris

Graph displays valuation outcomes for companies in the currency of their stock exchange (USD)

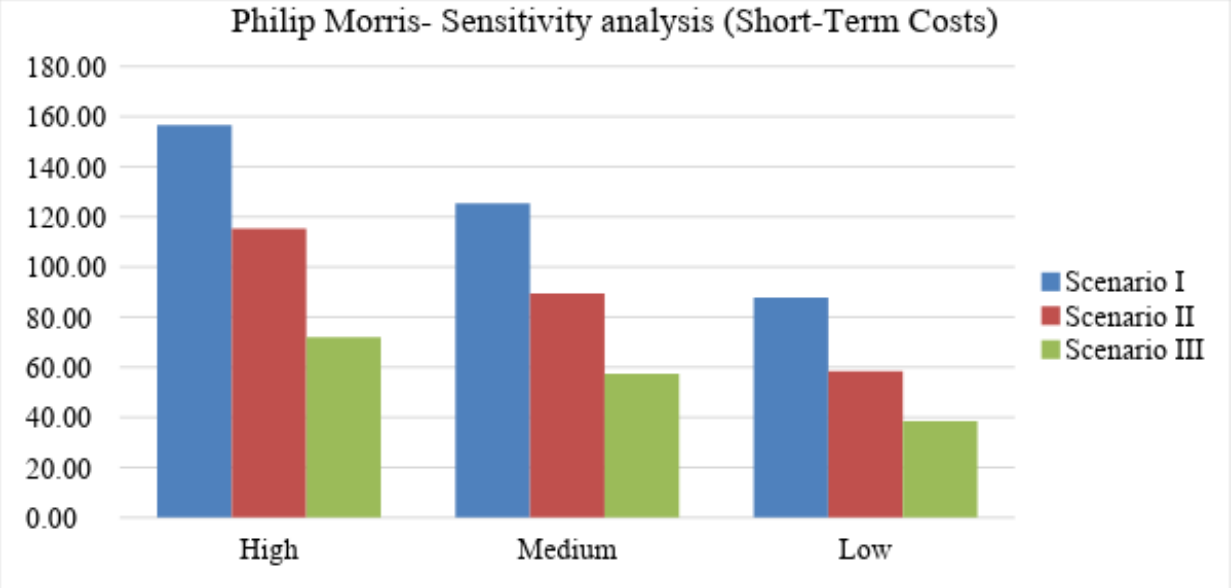


Figure 9. Valuation outcomes for Imperial Brands

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

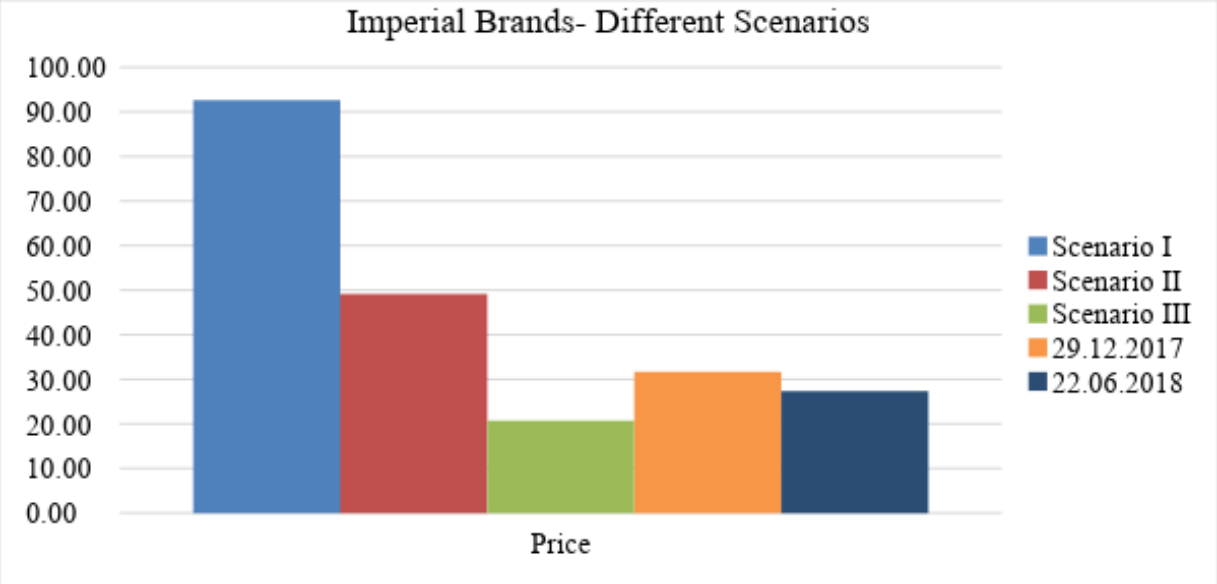


Figure 10. Valuation outcomes for WACC sensitivity analysis for Imperial Brands

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

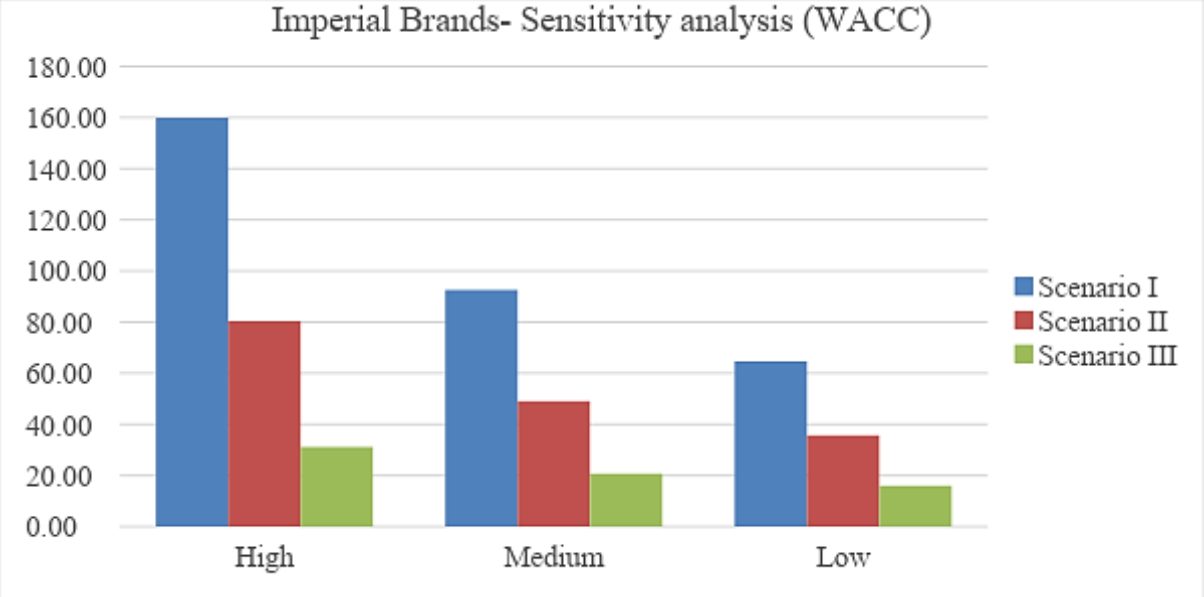


Figure 11. Valuation outcomes for Long-Term Revenue sensitivity analysis for Imperial Brands

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

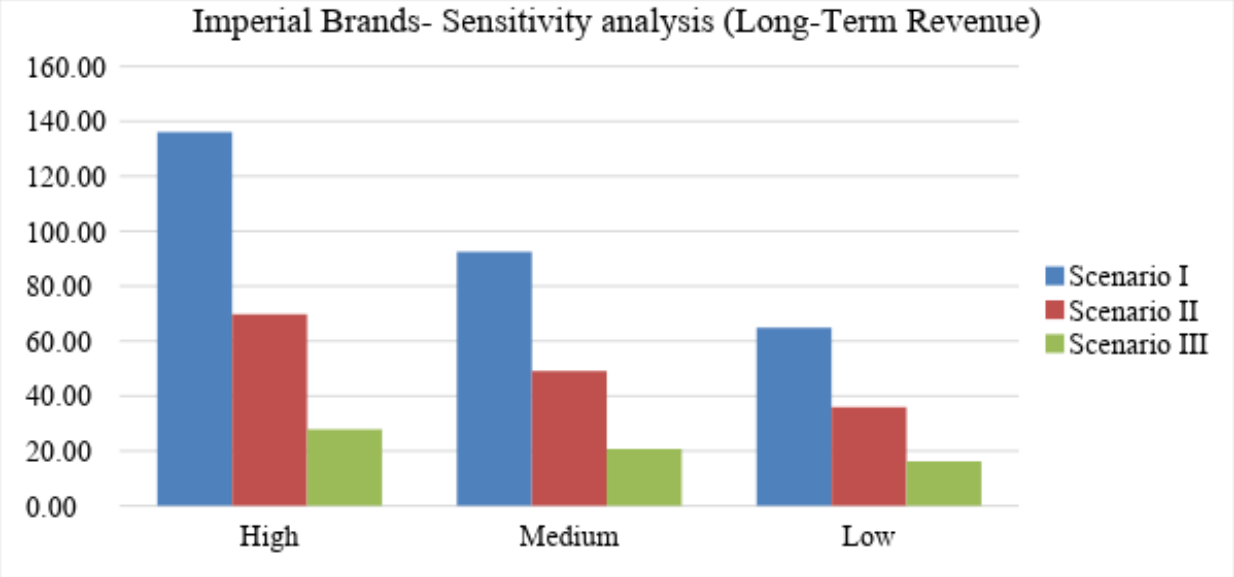


Figure 12. Valuation outcomes for Short-Term Costs sensitivity analysis for Imperial Brands

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

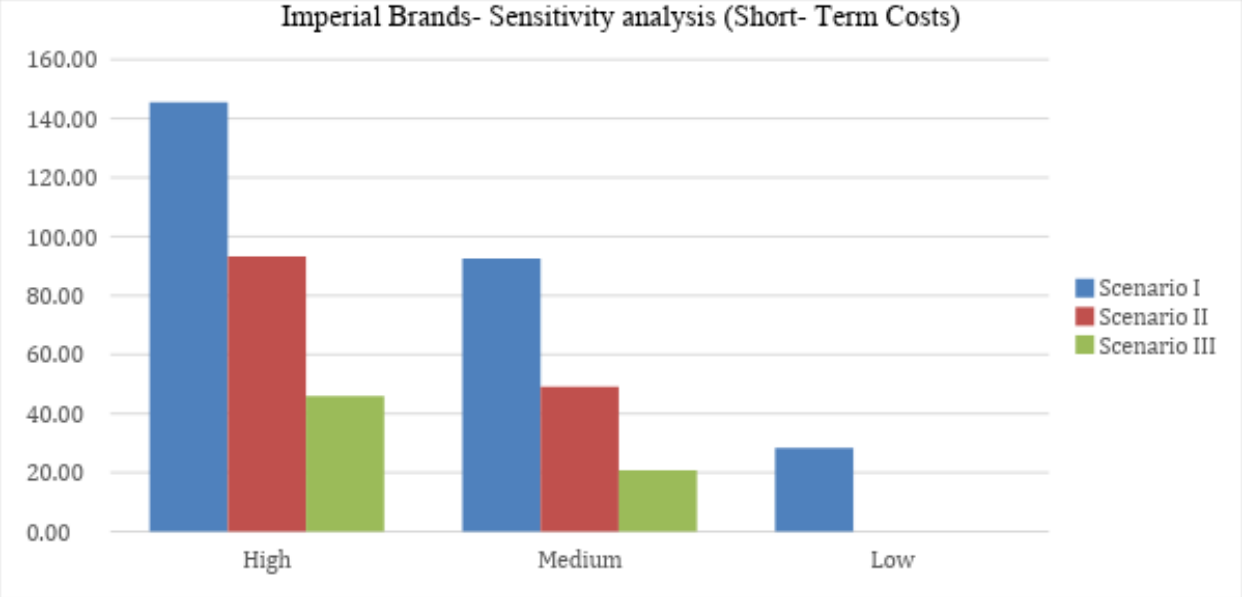


Figure 13. Valuation outcomes for British American Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

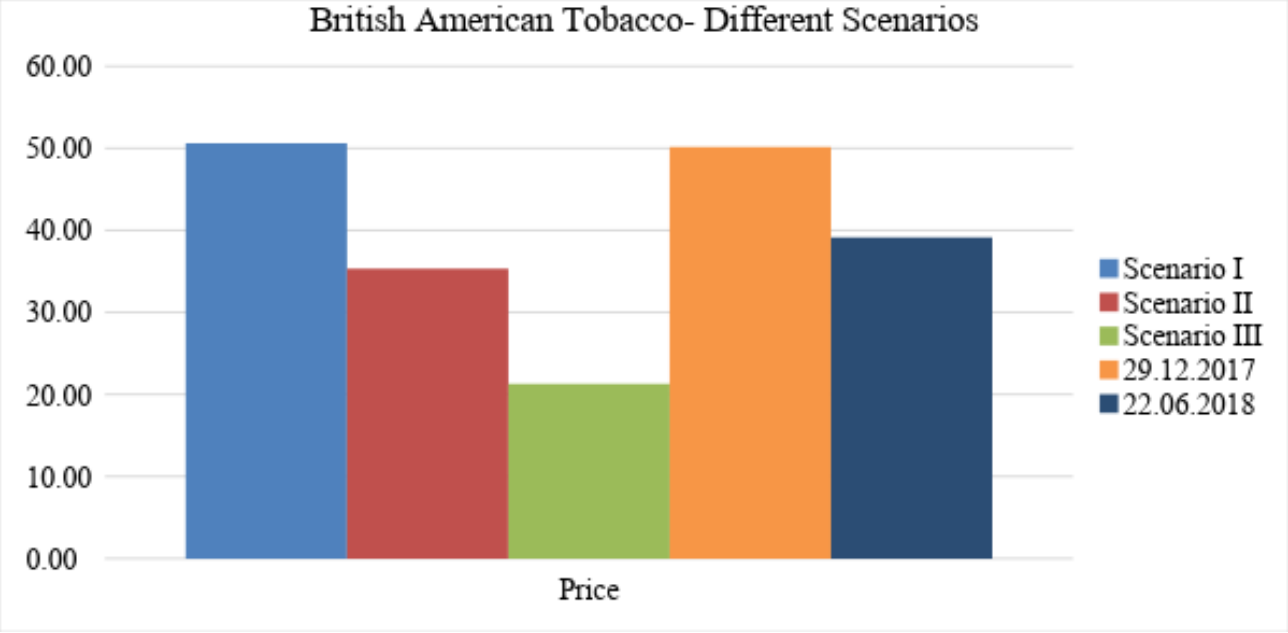


Figure 14. Valuation outcomes for WACC sensitivity analysis for British American Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

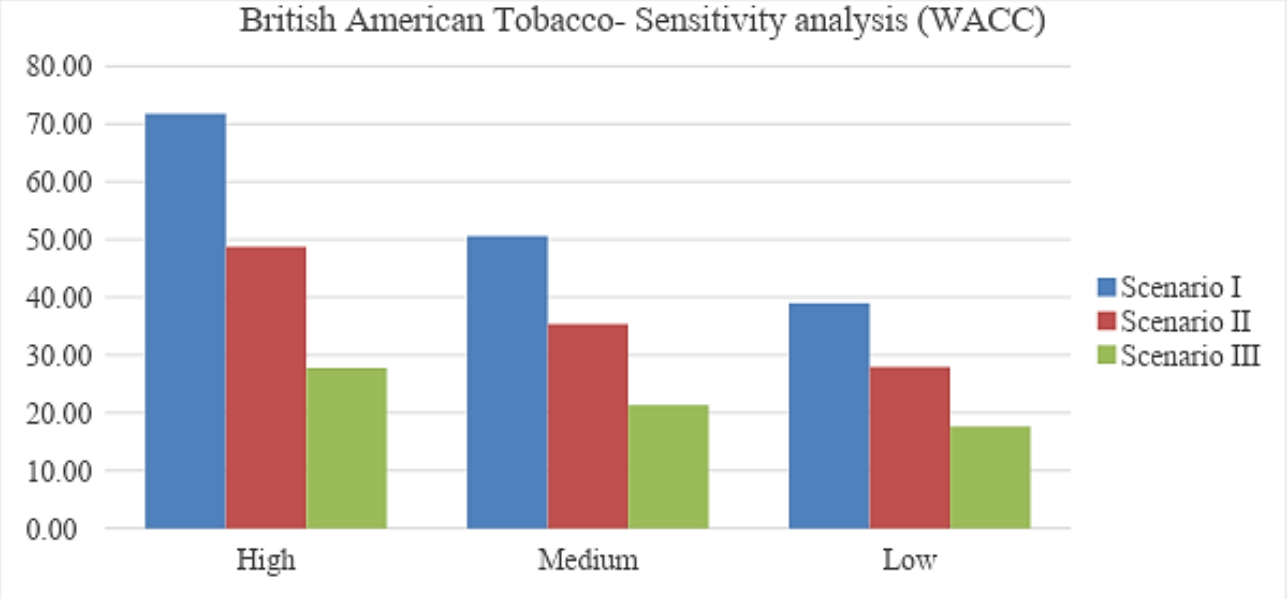


Figure 15. Valuation outcomes for Long-Term Revenue sensitivity analysis for British American Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)

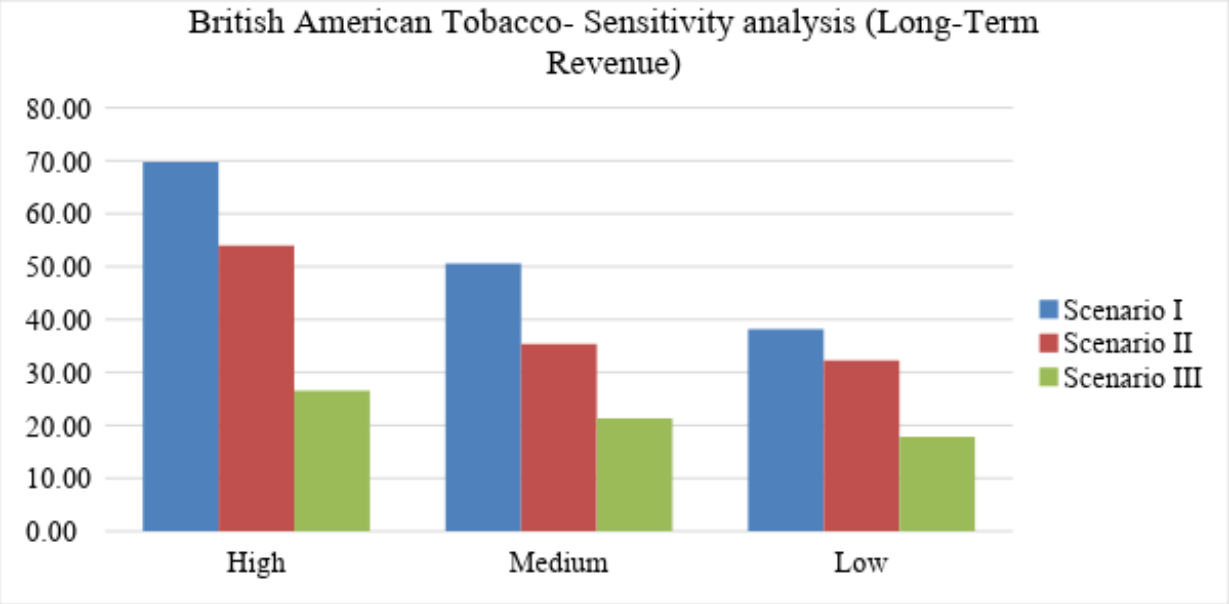
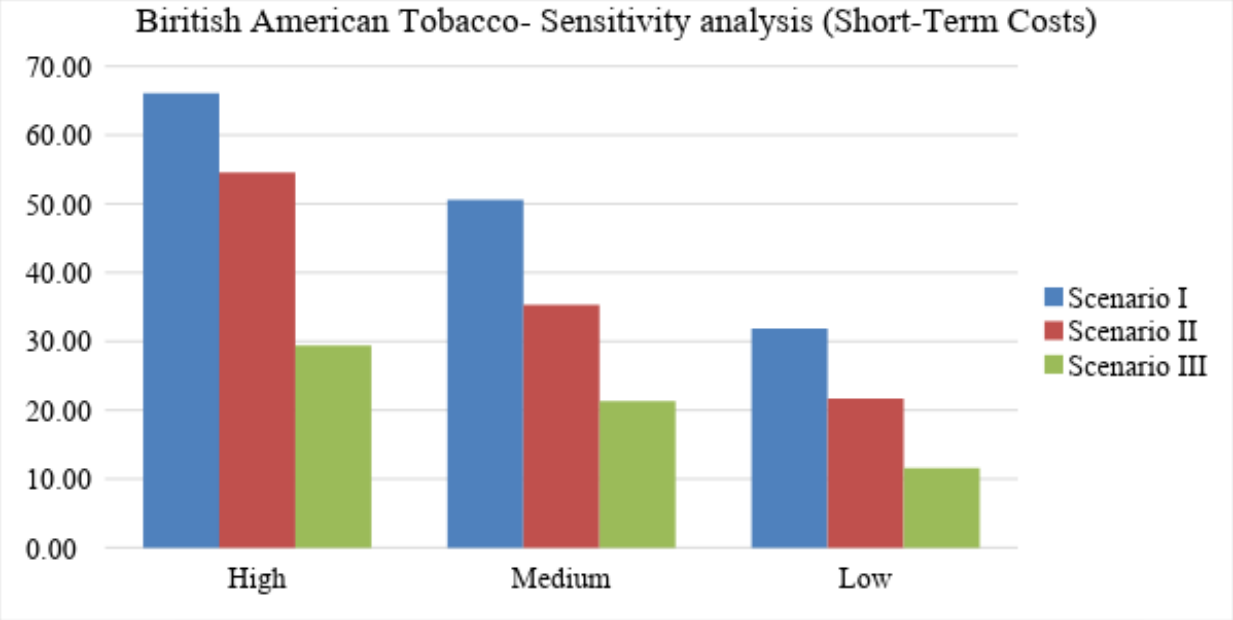


Figure 16. Valuation outcomes for Short-Term Costs sensitivity analysis for British American Tobacco

Graph displays valuation outcomes for companies in the currency of their stock exchange (GBP)



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