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CARLSBERG MARSTON'S
BREWING COMPANY

Figure 1: CMBC Logo [1]

Abstract

This report contains a detailed analysis of Carlsberg Marston's financial state and position in the market

Contents

1 Introduction, Existing Product and Market

1.1 Introduction to Carlsberg Marston's Brewing Company

Carlsberg Marston's Brewing Company (CMBC), formed in 2020, is the result of a merger between two companies, Carlsberg UK and Marston's Brewery [2]. Both companies have a long history of making beer in the UK. Carlsberg, after being founded in Copenhagen in

1847, sold their first beer in the UK in 1868 [2]. Similarly, Marston's have been brewing in the UK since 1834, as well as this they also manage 1393 pubs across the UK [3]. As Marston's CEO Ralph Findlay said this venture will *"... combine the best attributes of both [companies] to create a compelling beer business with an outstanding portfolio of global and local beer brands, proven brewing expertise, strong distribution network and wholesale opportunity."* [4]. As a joint company, they have a wide range of world, premium and craft beers as well as stouts and ales.

1.2 Value Chain

There are three main ways that the business can add value. These are Inbound Logistics: they add value by carefully selecting and sourcing high-quality malt, hops, yeast, and water, which are essential for brewing premium-quality beers. Operations: CMBC adds value by using its extensive history as a brewery to create a portfolio of well-tasting products. Finally, they seek to add value through Marketing and Sales: they add value by utilizing marketing campaigns, market research, product innovation and brand development. CMBC frequently invest in high-quality marketing campaigns, winning Campaign of the Year in 2019 [5], and have long-time brand ambassador Mads Mikkelson who provides a well-respected, likeable to the brand [6].
Operations and Marketing are where CMBC add the most value. Carlsberg had the second-highest usage and awareness total in 2022 2. They benefit from this in many ways, for example; increased sales, installing brand loyalty and repeat customers. Increased brand awareness also allows them to use their marketing effectively. They can save a lot of money by focusing on retaining existing customers instead of initial brand recognition.

1.3 Competitors and Market Position

CMBC have a wide range of competitors, notably AB InBev and Heineken who own many of the most recognisable beer brands, such as Stella Artois, Budweiser, Heineken and Amstel. Based on CMBC's on-trade estimates of 2020, just before the merger Marston's held a 1.5% share in the total lager market and 9.6% in the total UK ale market, whereas, Carlsberg had a 12.9% share in the total lager market and 3.8% in the ale market [8]. Fig. 3 shows the share of the UK beer market over the past three years. As AB InBev, Heineken and CMBC are all major producers and distributors of beer, they compete over many different submarkets, including premium lager, world beer and craft beer.

1.4 Adding Value

Neither Carlsberg nor Marstons had a significant market share in craft beers prior to the merger.
with Carlsberg being mainly lagers [cite %], and Marstons being primarily traditional ale [cite %].

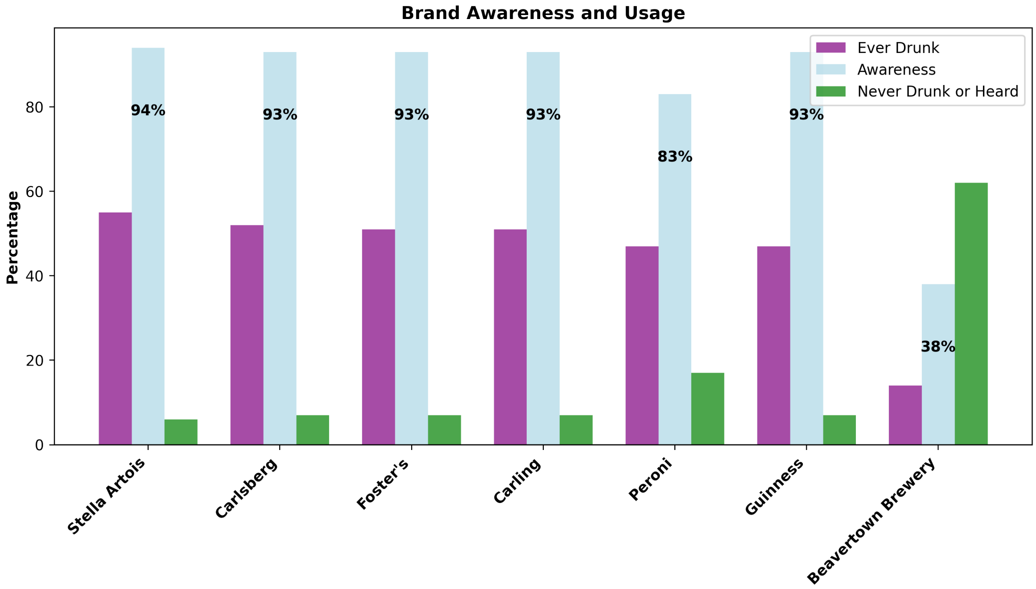

Figure 2: Plot showing the awareness and usage of different beer brands. Data from [7]

From these sources, it is clear that the craft beer market is the fastest-growing sector and can provide a great opportunity to add value to the company. Recently CMBC decided to close one of their main breweries, Wychwood, which is where the brand Hobgoblin is based. Due to Hobgoblin's existing image in the beer market (Beer of the Year awards citation and list), and the pre-existing need to rearrange their brewery, Hobgoblin would be the ideal place to start an expansion into the craft beer market. Utilize Carlsberg distribution and off-trade presence.

2 Financial Analysis

This section will use various financial ratios to analyse CMBC's current financial state. These ratios will be scrutinised in comparison to their competitors, AB InBev and Heineken.

2.1 Profitability Ratios

These ratios will assess the most important factor in business. Is the company profitable? This report will use gross and net profit margins to analyse CMBC's profitability. Using the definition from the Corporate Finance Insitute, the gross profit margin (GPM) is formulated as Eq. 1 and the net profit margin (NPM) as Eq. 2 [9]. Here COGS is the cost of goods sold.

$$GPM = \frac{\text{revenue - COGS}}{\text{revenue}}, \tag{1}$$

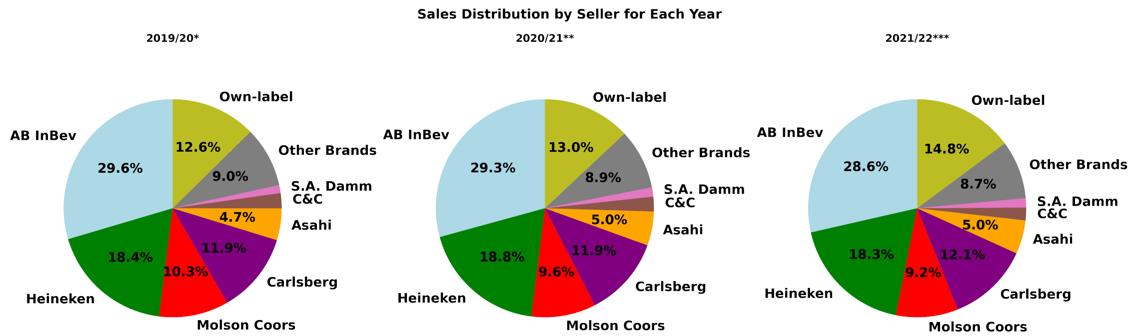

Figure 3: Market share of the top brands of beer in the UK between 19/20-21/22 [7]

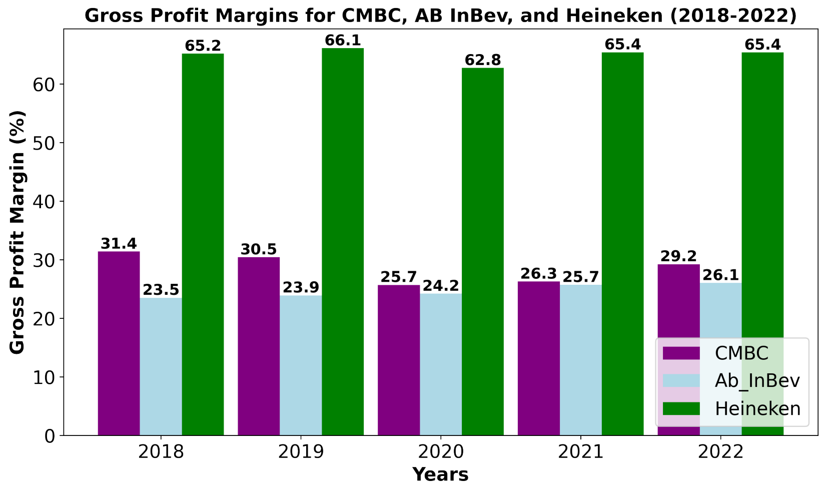

Figure 4: Gross Profit Margin from [10], [11], [12]

$$NPM = \frac{\text{revenue - all costs}}{\text{revenue}}. \tag{2}$$

In Fig. 4 and Fig. 6 the relative ratios are plotted from the past 5 years against their main competitors, AB InBev and Heineken. Heineken has by far the largest GPM of the three competitors, each year beating the combined total of AB InBev and CMBC, with an average of 65% over the last 5 years. AB InBev has steadily increased its gross profit margin with an 11% increase, from 23.5% to 26.1%, between 2018 and 2022. This is notable considering the effect that the COVID-19 pandemic had on the on-trade market. CMBC had a 16% decrease in gross profit margin between 2019 and 2020, the most affected of the three by COVID-19. All three companies have increased their GPM since 2020 as the beer market in the UK has slowly returned to pre-pandemic levels, as shown in Fig. 5. In 2020, the UK beer market saw a decline of around 30%, with on-trade being reduced by 50%, which was partially offset by off-trade growing by 30% [13]. For CMBC, this led to a 29%

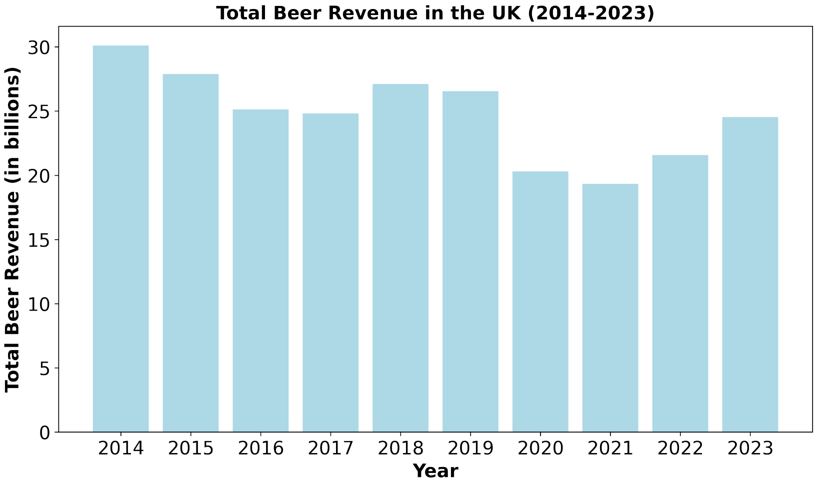

Figure 5: Beer revenue in the UK

decrease in turnover, and then a 40% decrease in gross profit.

The net profit margins are more sporadic and unstable than their respective gross profit margins. This is due to the increased amount of factors that can affect the ratio. Heineken again has the highest ratios, except for in 2020 where they had a decrease of over 200%. WHY? LOOK AT THE REPORT?

2.2 Return on Investment

Return on investment is another ratio which measures how efficiently a company generates a profit with its capital [14]. why important ——. Return On Capital Employed (ROCE), formulated by Eq. 3, is the ratio between profit before interest and tax against capital employed, which is the company's total assets minus its current liabilities. Here PBT is the company's profit before tax. The shareholder's capital is defined as the share capital plus the retained profit.

$$ROCE = \frac{\text{PBT}}{\text{Total Assets - Current Liabilities}}, \tag{3}$$

$$ROSC = \frac{\text{PBT}}{\text{Shareholder's Capital}} \tag{4}$$

Fig. 7 shows the distribution of Return on Capital Employed ratios for the past 5 years. Both Heineken and CMBC registered negative ratios during 2020 which is in line with the total beer market value shown in Fig. 5. Both of these companies have also bounced back quickly from the COVID-19 Pandemic, with CMBC increasing their return on capital employed by 140% from 2020 to 2022. Heineken has similarly increased by 327% from -3% to 6.8% over the same period. AB InBev differs from CMBC and Heineken, mirroring Fig. 6. They recorded their highest ROCE in 2020, of 10.4%, before losing profit in the following two years. While CMBC and Heineken have regained or increased their pre-COVID ROCE

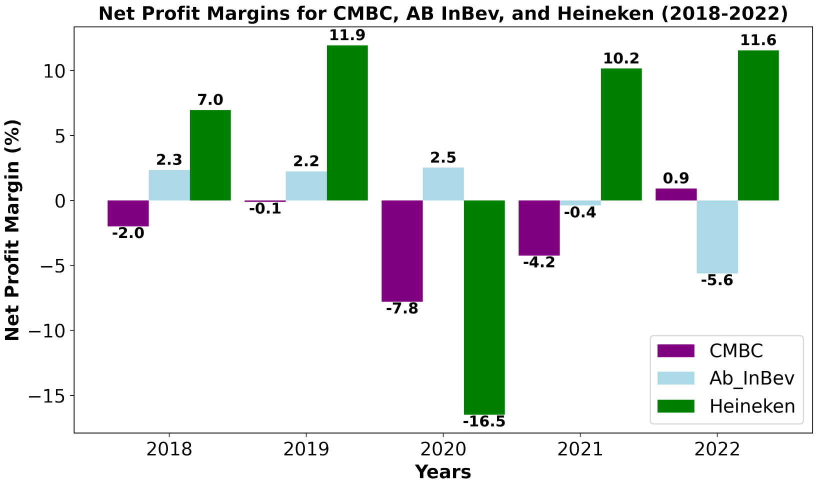

Figure 6: Net Profit Margin from [10], [11], [12]

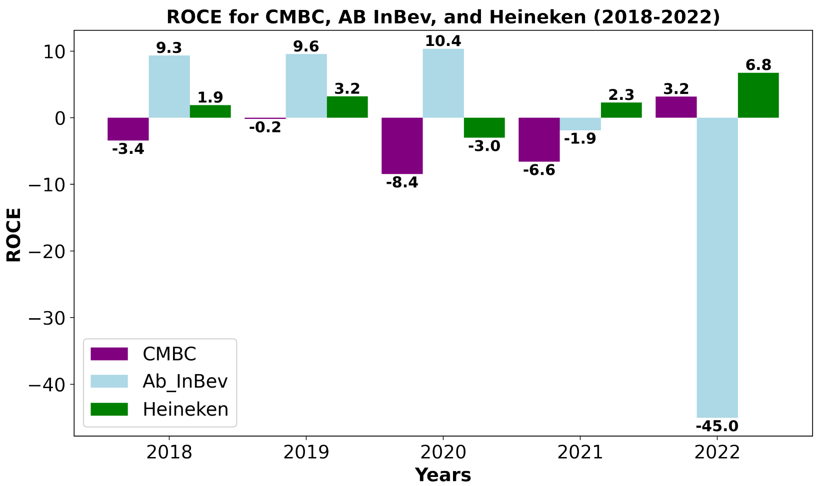

Figure 7: Return on Capital Employed from [10], [11], [12]

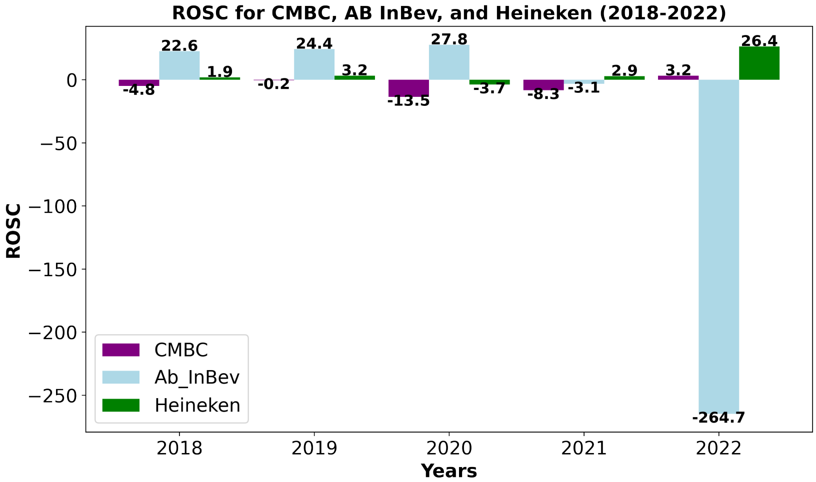

Figure 8: Return on Shareholder Capital from [10], [11], [12]

ratios in 2022, AB InBev has had their worst year with a ROCE of -45%. This trend is the same in Fig. 2 and Fig. 4 and requires a more in-depth look. blah blah blah We see a nearly identical pattern in Fig. 4, which shows the distribution of Return of Shareholder Capital ratios.
CMBC's steady climb since 2020 in all 4 ratios considered so far is an indicator that the merger is working, although more time and data are needed to support this conclusion fully.

2.3 Liquidity and structure ratios

Liquidity is a measure used to determine a company's ability to pay back its debts and liabilities. Here we will look at the Current Ratio, Gearing and Interest Covered. Current Ratio focuses on the short term and is equal to Eq.
—– Net Current Liabilities for AB InBev increased nearly 300% from 2021-2022 why?? Administrative Expenses also increased - 18% "On 11 March 2022, the company announced that it is forfeiting all financial benefits from the operations of AB InBev Efes, an associate which does business in Russia and Ukraine, in which it holds a 50company does not consolidate. On 22 April 2022, the company announced its decision to sell its non-controlling interest in AB InBev Efes and is in active discussions with its partner, Turkish Brewer Anadolu Efes, to acquire this interest. AB InBev's request regarding the suspension of the license for production and sale of Bud in Russia will also be part of a potential transaction. During the year ended 31 December 2022, the company derecognized the investment in AB InBev Efes and reported a 1 143m US dollar non-cash impairment charge in non-underlying share of results of associates. (Refer to Section Risks and uncertainties, Note 4 Use of estimates and judgements, Note 8 Non-underlying items, Note 16 Investments in associates and Note 31 Related Parties)." "`https://www.ab-inbev.com/assets/pressreleases/2023/2022%20Annual%20Report_FINAL.pdf''`

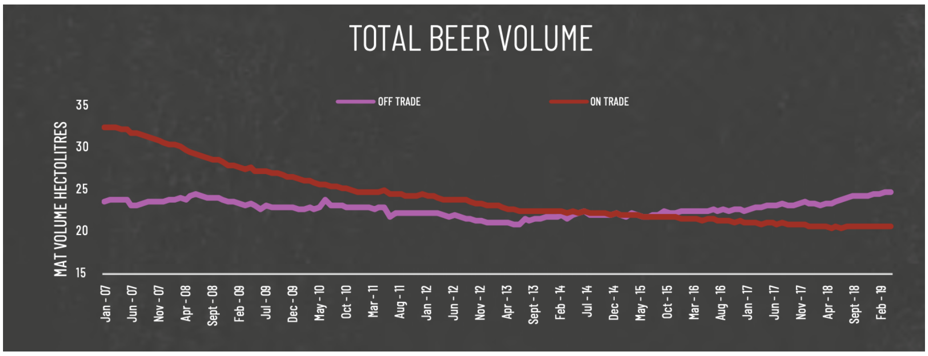

Figure 9: On Trade and Off Trade MAT Volume Trend [15] [16]

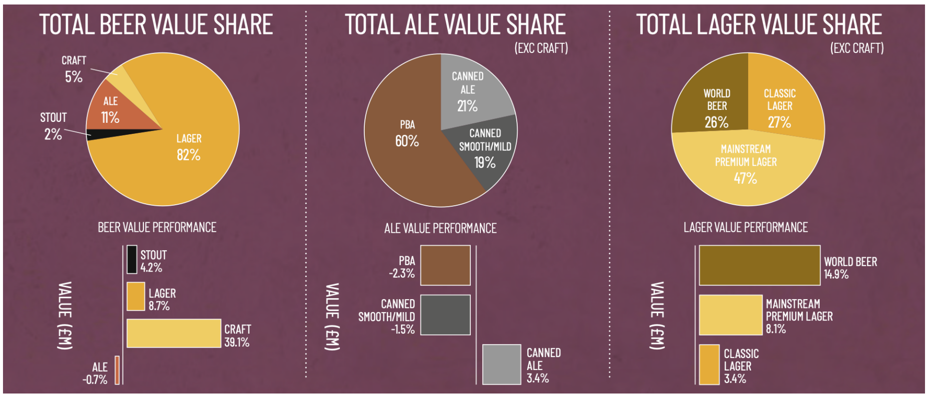

Figure 10: Off Trade Beer Value Share [15]

3 Adding Value

3.1 Market potential

The beer trade has been undergoing a gradual change for the past 10 years, as on-trade beer volume has seen a gradual decline of 34% from 32 to 21 hectolitres between 2007 and 2019, whereas off-trade has had a small increase of 13% from 24 to 27 over the past few years. This coupled with the impact on the on-trade industry by the COVID-19 pandemic, indicates that there is a lot of potential value in the off-trade market. As seen in Fig. 10, lager occupies the majority of the off-trade market contributing 82% of the total value. Craft beer only occupies 5% of the market, as of 2019, however has been increasing in popularity with an average growth of 3.9%. In 2022 craft beer bounced back from the COVID-19 pandemic with an increase in revenue of 15.4% [17]. It is clear from the above that the craft beer market has significant potential to add value to the business, not only in the UK but globally as well, as Fortune Business Insights projects the craft beer market to grow from USD 95.2 billion in 2020 to USD 210.8 billion in 2028. To further decide how best to add value this report will analyse the type of customer to target.

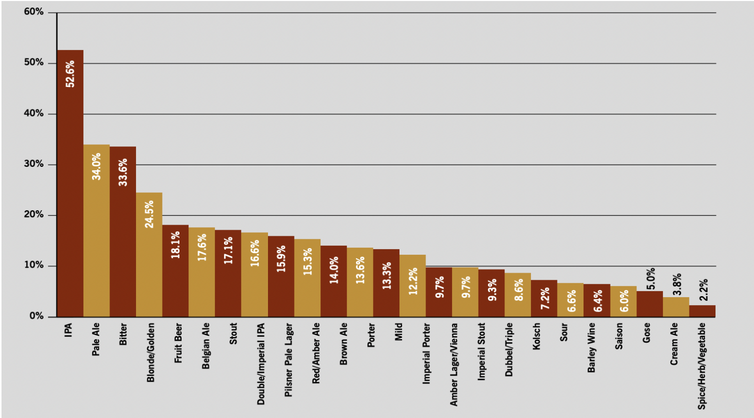

Figure 11: Shows the breakdown of styles of beer as selected by customers on trade. [19]

3.2 Market Research

New Product Development (NPD) can be costly and risky for businesses as it puts a strain on resources without guaranteed success [18]. In order to reduce this risk, extensive market research needs to be done to optimise the rate of success.

3.2.1 Ale and Lager drinkers

There are many differences between majority ale and majority lager drinkers. 67% of ale drinkers class themselves as 'experimental', compared to just 36% of lager drinkers [15], these figures are backed up by ale drinkers having an average 'beer brand repertoire' of 6.8, compared to lager's 4.7. Ale drinkers also spend more on alcohol, with a weekly average of £17.04 compared to just £15.35 of lager drinkers [15].

3.2.2 Type of Ale

After justifying that craft ale is the best place to add value, the type of craft ale needs to be determined. Picking the right style of beer to brew is instrumental to maximising the amount of value that can be added to the company. Consumer preferences can vary a lot by region, age, wealth and over time so one way of reducing this variety is by going for a safe option. Fig. 11 shows that IPA is by far the most popular type of craft beer, owning over 50% of the craft beer market. There is a lot of variation in the IPA market that makes it a suitable style of beer to target.

3.3 Where to add value?

Now that the style of beer has been determined, it is important to evaluate where best to add to the company's beer portfolio. CMBC currently owns 24 beer brands [2] so there is a lot of area to add value, however 37% of ale drinkers say that recognising the beer brand is a primary factor in selecting a new beer [15].

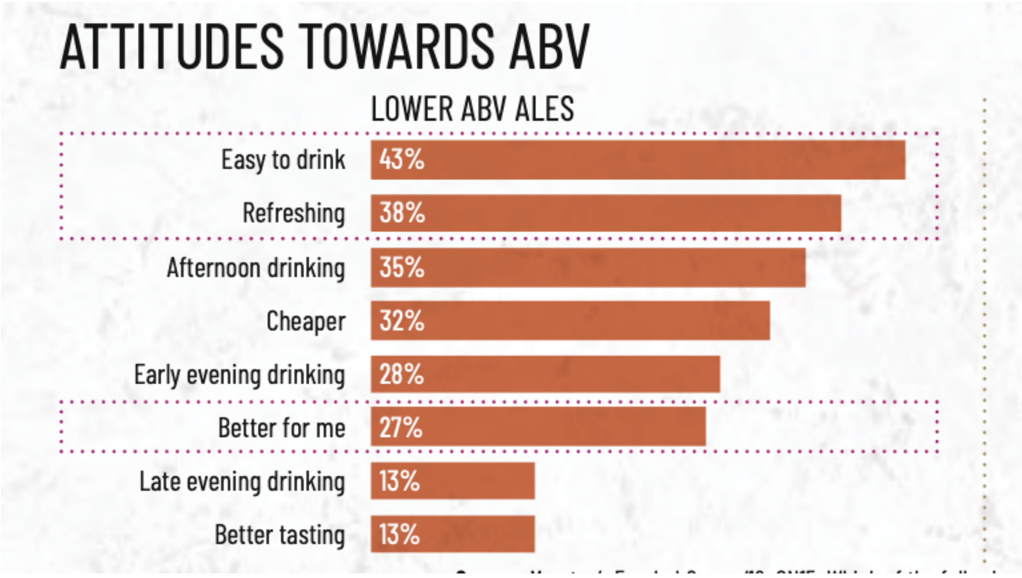

Figure 12: Figure showing consumers attitudes towards lower ABV ales [2019] [15]

Hobgolbin is a staple of the Marston's brewery, with their Hobgoblin IPA being crowned 'Country Winner' in the 'English IPA' category in 2021, and 'Worlds Best IPA' in 2018 [20] [21]. Hobgoblin also has acclaim in many other categories, with their Gold and Ruby Beers winning multiple awards over the past 5 years. This shows that Hobgoblin has the respect and experience to maximise the success of a new IPA. In addition to this, CMBC recently announced the closure of the Wychwood Brewery, one of their main breweries and where Hobgoblin is based [22], causing the need of reorganization and distribution of Hobgoblin. This natural need to reshuffle the business can provide a perfect opportunity to introduce a new beer into Hobgoblin's portfolio.

The new product needs to be different enough from Hobgoblin's English and Session IPAs [23], but still fit within the brands image and repitoire. There are 9 main types of IPAs; The English, West Coast, East Coast (New England), Double, Triple, Session, Black, Belgian and Grapefruit [24]. Double and Triple IPAs are much more alcholic and hoppy than a normal IPA, with ABVs (Alcohol By Volume) of 7.5% upwards for Doubles and 10% and upwards for Triples [25]. Due to the 60% rise of no/low alcohol beer since 2017 [15], and Fig. 12 showing that 43% of consumers think that lower ABV ales are easier to drink, investing in Double and Triple IPAs would be unwise given the trend in healthier living. Black, Belgian and Grapefruit varieties are less popular than their counterparts (as shown in Fig. 13, and therefore there is a large amount of risk involved for a company that has limited experience experimenting with IPAs, this is why they are generally brewed by smaller breweries in smaller batches. This leaves the West Coast and East Coast varieties. There are a lot of differences between the two varieties, with the West Coast being the more established and well-known of the two [27]. The key differences lie in how they are brewed, West Coast IPAs have hops thrown in during boiling [27] in order to extract the maximum bitterness.

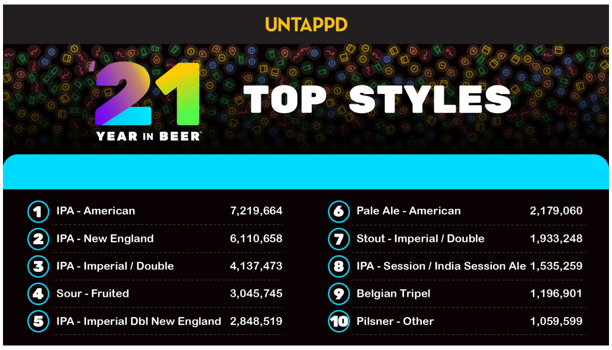

Figure 13: Figure showing the popularity of various beers [26]

East Coast IPAs (also known as Hazy or New England variants) are much less bitter, more fruity and have a distinct haze from the oats, wheat or yeast introduced during brewing [28]. Hazy IPAs are seen as less extreme than a West Coast [29], and therefore carry less risk as they can appeal to a larger audience, especially with a company such as Hobgoblin who are known for more traditional lagers and ales. Hazy IPAs are also a newer variant and not too many are made in the UK yet, so CMBC have an opportunity to capitalise on a new and growing market [24]. The proposal is then to create a New England Hazy IPA with a medium ABV that will appeal to a large audience of lager and ale drinkers.

3.4 Estimated Profits

In order to estimate the profits that a new product will generate we first need to work out how much it costs to make the beer. The first step in this process will be the brewing process. The brewing process for each style of IPA changes drastically so to estimate the profit CMBC's new product will be compared to BrewDogs Hazy Jane NEIPA [30]. A similar recipe to the Hazy Jane [31] uses 13.97 lb of malt and grain for a batch of 5.75 gallons. The average price of malt in the UK, in 2023 was £0.96 per lb [32]. The recipe also uses 13.75 oz of hops, with an average price of US$ 6.10 per lb [33]. This comes out to a price of £3.07 per gallon, or £0.81 per litre for the ingredients. In reality, this is an overestimation due to the fact that a global company such as CMBC will be able to reduce the cost of ingredients by buying in bulk and having contacts within the industry. To account for this, we shall lower the cost by 20%, resulting in a cost of £0.65 per litre.

In order to calculate the profit this new product can generate we will compare it to the existing Hobgoblin IPA. Using another clone recipe [34] we can calculate the cost of grain and malt to be £0.50 per litre and the cost of hops to be £0.11 per litre. This lines up with what is expected due to the differing brewing styles for an English and Hazy IPA. We will also lower the cost of this by estimating that CMBC can get an average of 20% cheaper raw materials through established suppliers. Fig. 14 shows that the cost of ingredients only accounts for about 10% of the cost of the whole beer (In the US). We can use this breakdown to estimate the costs of other factors, before calculating CMBC's projected profits.

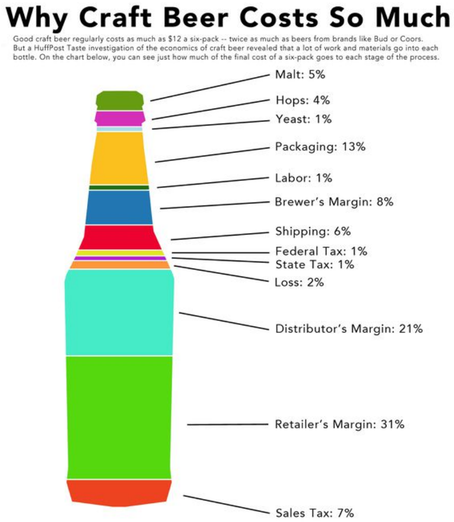

Figure 14: Breakdown of price of a craft beer [35]

Beer Type	Ingredients (10%)	Packaging and Labour (14%)	Shipping (6%)
New Hazy IPA	£0.65 per litre	£0.91/l	£0.39/l
Hobgoblin IPA	£0.49 per litre	£0.69/l	£0.29/l

Table 1: Operation costs of new product in £ per litre (£/l)

Table 1 uses the breakdown in Fig. 14 to calculate the rest of the operating costs. These total to £1.95 per litre of the new Hazy IPA product and £0.98 of the existing IPA. Brewdog sells its Hazy Jane IPA at £4.65 per litre [36] (off-trade), whereas Hobgoblin sells its IPA for £3.50 per litre [37] (off-trade). The proposal is to sell the new product, which is more expensive to make, at £4.50 per litre. We will now calculate how much of a profit margin this leaves CMBC by estimating the other costs associated with the new product.

The tax works differently in the UK compared to the US, so we can not rely on Fig. 14. Tax on beer is a combination of 20% VAT, and Alcohol duty, which is currently £19.01 per litre of pure alcohol [38]. The proposed new product has an ABV of 5%, which comes out to £0.95 per litre. Hobgoblin's IPA has the same ABV so has the same alcohol duty [37].

Beer Type	VAT (20%)	Alcohol Duty
New Hazy IPA	£0.9/l	£0.95/l
Hobgoblin IPA	£0.7/l	£0.95/l

Table 2: Taxes on each type of beer per litre.

Hobgoblin sells over 50 million pints annually [39], which if we assume, as a minimum, is spread evenly between its 10 current beers we can calculate that CMBC will also sell 5 million pints of the new Hazy IPA product. We can use this and the above information to work out the profit margin on the new beer, and thus the total profits generated. Table 3

Beer Type	Total Cost	Selling Price	Profit/litre	Total Profit
New Hazy IPA	£3.80/l	£4.50/l	16%	£1.99 million
Hobgoblin IPA	£2.63/l	£3.50/l	25%	£2.47 million

Table 3: Annual total profit (before taxation) by beer type

shows that these calculations estimate that CMBC can see a profit of £2 million per year by introducing a new Hazy IPA product. The assumptions made both over and under-estimate in certain places, however, if the interest in craft beer follows its current trajectory [19], CMBC will be 'future-proofing' by getting in on an upward trend early. The new product also has a lot of potential to surpass other beers in Hobgoblin's repertoire as Hazy IPAs are known to be easier to drink than other IPAs and Stouts [40], opening Hobgoblin up to a wider audience. Finally, as craft beer is more popular off-trade compared to on-trade [19], CMBC will be further protecting itself from the general decline in on-trade sales [16] by investing in off-trade focused ales.

3.4.1 Limitations of Assessment

This assessment of the potential value added by introducing a new product is lacking in numerous areas. Access to more data would have allowed us to analyse the demand, cost, and potential profit much more and calculate the uncertainty on each prediction. For example, this report used a 'clone' recipe on a home-brewing website in order to calculate the cost of brewing the ale, however, CMBC will have different methods as it is brewing on an industrial scale [41]. The difference in capacity, methods and equipment will heavily impact the price of making the beer.
The report then used a rough method of extrapolation to estimate the cost of other operational processes, such as shipping and packaging, again data from the company itself would have allowed for more precise calculation of the costs surrounding a new product. In addition to this, there is also a lack of information on individual product sales, so this report has used a rough average of 50 million sales [39] spread equally over all ales, however, this could easily be inaccurate. Figures and data from market competitors, such as AB InBev's Beavertown Lunar Haze [42] would also have helped assess how much potential there is within the market.

3.5 Summary

To summarize, this report suggests that introducing a new Hazy IPA product to CMBC's and Hobgoblin's portfolio will increase their annual profit by approximately £2 million. This new product has the potential to grow even more as it tracks the craft beer expansion seen in the beer market over recent years.

4 Risk Management

4.1 Introduction to Risk

Throughout this report, there have been many implied risks that CMBC are already quite versed in dealing with. For example within the beer market, there is always a strategic risk of market changes and consumer preference shifts [43]. CMBC already mitigates this risk by having a broad beer portfolio across most types of lager and ale [2]. Another potential risk could be the energy crisis due to the ongoing Russia-Ukraine war [44], however, CMBC is prepared against this as they are close [45] to their 2030 target of producing all energy by renewable sources [46]. This makes them rely less on natural gas, which is one of the main impacts of the Russia-Ukraine War [47]. This report will focus on a more inelastic risk, inflation.

4.2 Inflation

Inflation is a constant risk to all businesses [48], as it causes consumers 'real salary' (which takes into account inflation) to be lower, causing them to spend less [49]. The beer industry is especially sensitive to inflation (shown in the generally higher rates of inflation Alcohol CPI in Fig. 15) due to a combination of consumers spending less and higher production costs resulting in under-absorption of fixed costs [50][Page 51]. The main way of showing the impact of inflation is through CPI calculation, which is the Customer Price Index. This is a calculation of the average price of a basket of common everyday items [48]. It is calculated as a percentage over a base year.
Fig. 15 and Fig. 16 show the change in inflation (CPI) rates between 1989-current and 2019-current respectively. In Fig. 16 it is clear that there has been a steady increase in the general CPI since the effects of the COVID-19 pandemic kicked in around September 2020, with general inflation peaking in September 2022 at 9.6%. This is an average increase of the inflation rate of 0.36 per month, or 4.35 per year. As seen in Fig. 15 this is the sharpest and longest sustained increase since before 1989. Since peaking in September 2022, general CPI has begun to fall, the Bank of England currently calculates it as 4.2% [49]. However, despite this, the CPI on alcohol, tobacco and narcotics has continued to rise, peaking at 11.2% in September 2023. This report will analyse the risk that CPI alcohol inflation imposes on the business.

4.2.1 The EMV Method

The expected monetary value (EMV) method is a well-studied method used to calculate the potential impact of various risks in a given time period [53]. It is formulated through Eq. 5, where probability is the probability of an event occurring, and impact is the predicted monetary impact on the business.

$$\text{EMV} = \text{Probability} * \text{Impact} \tag{5}$$

This report calculates the EMV of inflation in the UK remaining above 4.5% until 2025.

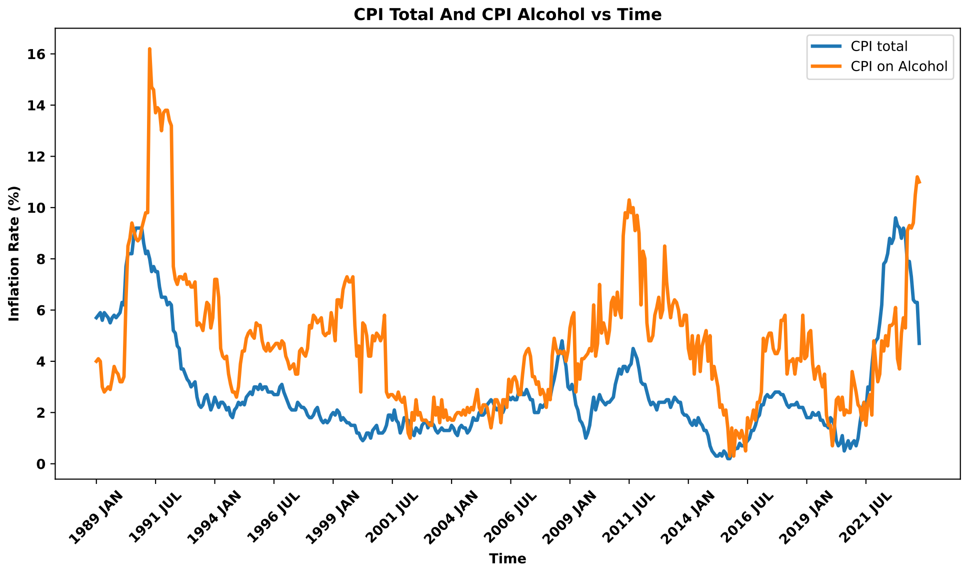

Figure 15: CPI (Alcohol, Tobacco and Narcotics) and CPI (Total) over time. Data from [51], [52]

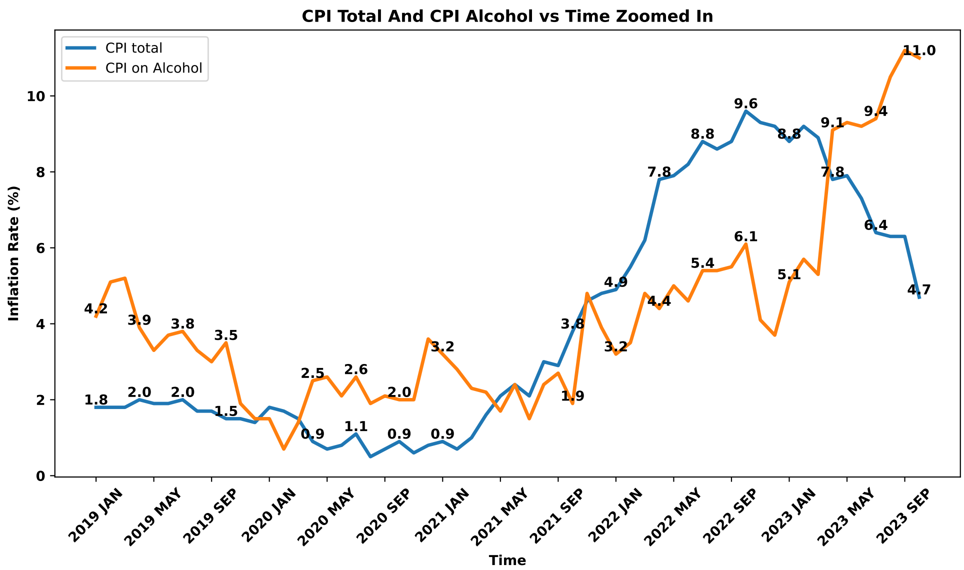

Figure 16: CPI (Alcohol, Tobacco and Narcotics) and CPI (Total) from 2019-current. Data from [51], [52]

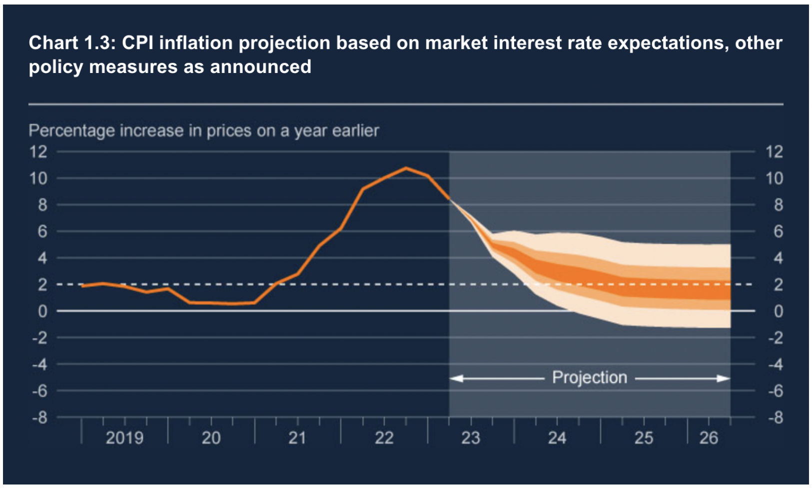

Figure 17: A fan chart showing Bank of England's predicted inflation rates going forward [56]

4.2.2 Probability of event

Predictions of inflation are notoriously hard to perform, due to its volatility and dependence on world events [54]. The Bank of England recently admitted to underestimating the rise of inflation and thus didn't react as quickly as it should have [55]. Using the discussion given in Bank of England's Monetary Report [56] and Fig. 17, we can estimate the probability of inflation remaining above 4.5% to be 12.5%. This comes from the fact that 90% of the time inflation should be inside the fan (meaning 5% above the fan), and each fan section contains another 30%. We have divided the top pale orange section (which would then contain 15%) by 2. Adding these together gets us a percentage of 12.5%.

4.2.3 Potential Impact

Beer companies and breweries are being impacted by inflation on all fronts. For example, the Russia-Ukraine conflict has caused an increase in gas across all of Europe [57] due to supply restrictions and sanctions. This has caused a spiral effect through the wholesale economy, as farmers' costs have increased dramatically [58]. This in turn has impacted the price of raw materials across many markets. Calculating the precise monetary impact of this would require a detailed analysis and breakdown of each component that goes into making beer at CMBC. Instead, this report will estimate the effect by comparing the cost of sales per revenue [59].

Beer Production Cost

In order to predict the impact that an inflation rate of 4.5% will have on the company, we need to calculate how it changes its operating and production costs. Due to the lack of information on CMBC's total volume sold per year, this report will use figures from its parent company, the global Carlsberg Group, and assume that the figures are proportional to CMBC's. Fig. 18 calculates the cost of goods sold from Carlsberg's annual revenue and

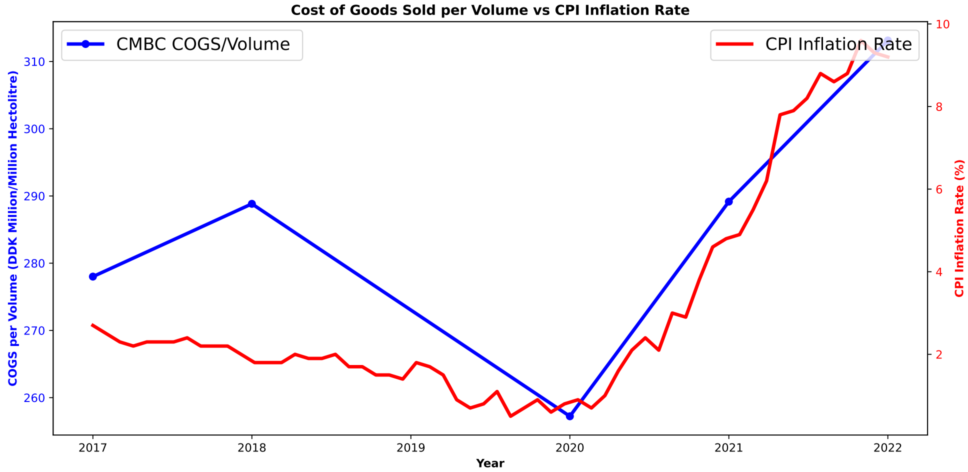

Figure 18: Cost of Goods Sold per Volume (Carlsberg) with inflation. [50]

gross profit [50]. The ratio of this over volume sold tells us about the relative increase in cost per volume due to inflation. This graph tells us that Carlsberg experienced an increase from DKK million 289 per million hectolitres (£0.347 per litre) to DKK million 313 per million hectolitres (£0.376 per litre) from 2021 to 2022. This is an annual increase of costs per volume of 8.2%, slightly higher than the average inflation rate for the UK, which was 7.8% between 2021 and 2022 [60]. This would predict that the cost of sales per volume tracks the rate of inflation quite well and linearly, however, Carlsberg (Global) reported an increase of 13% in cost of sales per litre [61]. To account for this discrepancy, we shall estimate that if the rate of inflation remains at 4.5%, the cost of sales per volume will grow by 5% per year. In this calculation, we have assumed; that the Bank of England's calculation [56] is correct, that CMBC experiences proportional cost per volume increases as it's global parent company Carlsberg, that inflation acts constant across all raw materials (instead of finding/calculating with individual inflation rates) and CPI alcohol and tobacco rates will carry on to lag behind the total CPI inflation rates (as shown in Fig. 15.

Now we have estimated the percentage increase we can estimate the monetary impact this will have on the company. We will assume that CMBC will keep its volume and revenue constant (no price changes) for the next two years. If there is a 5% year-on-year increase in cost per volume and volume is constant, there will be a 5% increase in cost of goods. As there is no CMBC COGS information for 2023, we will use the Bank of England's inflation calculator to predict the annual inflation rate for the year [62]. CMBC's cost of goods sold in 2022 was £548,411,000. This, due to inflation, would be £572,512,164 in October 2023. These prices can be put into Eq. 6 to find x, the monthly inflation rate, to be 0.479%. Extrapolating to the end of the year gives us an expected COGS due to inflation of £581,423,123. This is done by using Eq. 7 [63]. Table. 4 shows the cost of goods sold per year, calculated by extrapolating from the 2022 figure [11] and assuming the 2023 figure of

Year	2022	*2023*	2024	2025
COGS (GBP Million) Risk	548.4	*580.8*	609.8	640.3
COGS (GBP Million) Base Inflation	548.4	*580.8*	592.4	604.2
Potential Loss (GBP Million)	N/A	N/A	17.4	36.1

Table 4: Caption

Year	2024	2025
Total Impact (M£)	17.4	53.5
Probability (%)	12.5	12.5
EMV (M£)	2.2	6.7

Table 5: Table showing the cumulative EMV from 2024-2025

£581.4 million. The COGS Risk is calculated assuming the annual inflation remains at 5% and is compared to the Bank of England's definition of a healthy inflation of 2% [64].

$$\frac{\text{Oct23 Price}}{\text{Jan23 Price}} = x^9 \tag{6}$$

$$\text{COGS '23} = \text{COGS '22} * \text{Annual Inflation} = \text{COGS '22} * x^{12} \tag{7}$$

4.2.4 EMV Evaluation

Combining this into Eq. 5 we can calculate the expected monetary value of the risk of inflation remaining high. Table. 5 shows the cumulative EMV of the risk of inflation. This shows that over the next two years, the EMV will rise to £6.7 million if nothing is done to minimise the impact of inflation. £6.7 million is a sizeable part of the business's profit margin in 2022 it would reduce their profit before taxes by 94% from £7.1 million to £0.4 million [11]. This justifies that action is needed against inflation.

4.3 Mitigation of impact

4.3.1 Pricing Strategy

As discussed above, action needs to be taken to reduce the impact of inflation on the business. One of the most common ways to mitigate inflation is by increasing the wholesale price of products [65]. This can help CMBC recover some of their profit margin and offset the increase in the cost of goods sold. Both Heineken and AB InBev have already increased their prices in January and March respectively [66] [67]. However as CMBC have also recently increased their prices [68], it is not as simple as a blanket percentage increase across all products. If a company increases its prices too sharply it can lead to fewer sales and therefore a loss of market share to the competition. It is therefore recommended that

Year	2024	2025
COGS (GBP Million) Risk	609.8	640.3
Inflation Increase (GBP Million)	17.4	36.1
Potential Saved (GBP Million)	18.1	37.3

Table 6: Cumulative savings and increases in Cost of Goods Sold from 2024-2025

CMBC does not increase its prices yet, but regularly review the current pricing strategy and be prepared to make changes if necessary. They will need to increase their prices by at the absolute latest 2025 in order to retain a profit.

4.3.2 Production efficiency

Another common way to lower the impact of inflation is to cut costs and increase efficiency [65]. This is something that CMBC can act on immediately. The closure of Wychwood Brewery [22] was mentioned earlier in the report and enables an opportunity for CMBC to increase their overall production efficiency.
There is strong research that suggests that centralizing a business increases efficiency and reduces overhead costs and waste [69]. AB InBev is an example of a company that has a standard centralized brewing model throughout its history of mergers [70]. Centralized production has many benefits such as reduced downtime and increased utilization resulting in increased overall efficiency [71]. However, this results in less flexibility and greater dependency on the production site, leaving the business at a greater risk. CMBC already have a slightly centralized business model, with their Northampton brewery being the main production site. This brewery has seen a 6.2% increase in water efficiency from 2016 to 2022 [46], which further reinforces the idea that centralized production sites can reduce waste. Therefore the proposal is for CMBC to absorb some of the costs due to inflation by merging the soon-to-be-closed Wychwood brewery into the Northampton brewery.

4.4 Potential Savings

A report has calculated that centralized production leads to a decrease in 10% of manufacturing costs compared to decentralized businesses [72]. In the case of CMBC, this is likely to be an overestimate, as its supply chain and production line are already quite centralized. Due to a lack of information on the relative volumes of the two breweries and the company overall it is hard to evaluate how much of an impact this will have on the company's manufacturing costs. The Wychwood brewery produces 50 million pints annually [39], in which the company sells at an average £4.57 per pint [73], contributing £230 million of CMBC's £775 million annual revenue. We shall estimate therefore that Wynchwood contributes 30% to the overall business. Therefore, centralizing Wynchwood and absorbing the manufacturing costs into the central Northampton Brewery will save CMBC 3% As seen in Table. 6, the potential savings of centralizing the Wyncwood Brewery completely offsets the potential rise in COGS due to inflation. To do this better would reduce Wyncwood specific costs by 10%

EMV - inflation costs - probably suggest not to do anything - value of costs of risk - percentage of profit margin reduced - less profit etc -already closed wynhcwood - brand image -wait at least a year for economy to balance

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