JOURNAL OF FINANCE CASE RESEARCH

Volume 19, Number 1 2021

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The Journal of the
INSTITUTE OF FINANCE CASE RESEARCH

Volume 19, Number 1 **ISSN 1527-5426**

JOURNAL OF FINANCE CASE RESEARCH

The Official Journal of the
INSTITUTE OF FINANCE CASE RESEARCH

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2021

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Journal of Finance Case Research
The Journal of the Institute of Finance Case Research
Huntsville, Texas

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Letter from the Editor

I am pleased to present the first 2021 issue of the *Journal of Finance Case Research*, the official journal of *The Institute of Finance Case Research* (IFCR). With the pandemic, 2020 and 2021 have been difficult years for the journal and the Institute. Our senior editor, Bob Stretcher, along with numerous associate editors and reviewer volunteers have contributed a great deal of time and energy to keep things moving forward. I have also benefitted from the patience and support of our submitting author community.

The IFCR provides an avenue for the writing of cases and their submission for peer review. Cases accepted for publication in the *Journal* have met the quality requirements of a double-blind review process, and they are available for use through *Journal* subscriptions or by contacting the *Institute* for electronic copy access. Teaching notes are available to instructors desiring to use each case by contacting either the *Institute* or the authors.

The *Institute* continues to promote the interaction of case writers in conference settings. I invite case writers and case users to participate in the activities of the *Institute*. Our case sessions are held at a variety of finance conferences and provide the opportunity for interaction with others with a similar interest. Our recent conference activities have taken place in Fort Lauderdale, San Antonio, Charleston, Denver, Savannah and other popular destinations. Cases submitted for conference presentation are eligible for the review process for the *Journal*, and we have collaborated with different conferences (such as Financial Education Association) on special issues in the past.

Our overall objective is to create an outlet for case writers, and to build a source of quality cases for case users. Cases presented at our conferences, having had the advantage of being exposed to the scrutiny of experienced casewriters, have a better chance of final acceptance for journal publication.

Our acceptance rate is never more than 25%. The *Journal* is listed in *Cabell's Directory of Publishing Opportunities in Economics and Finance*, and it is also on the Australian Business Deans' Journal Quality List.

This issue of the *Journal of Finance Case Research* contains several cases that we hope you will find useful in your courses and consulting work. Please visit our Web site often for updates and conference information. We encourage all parties interested in the production, promotion, and use of cases in finance to become active participants in the IFCR.

Timothy B. Michael, Editor
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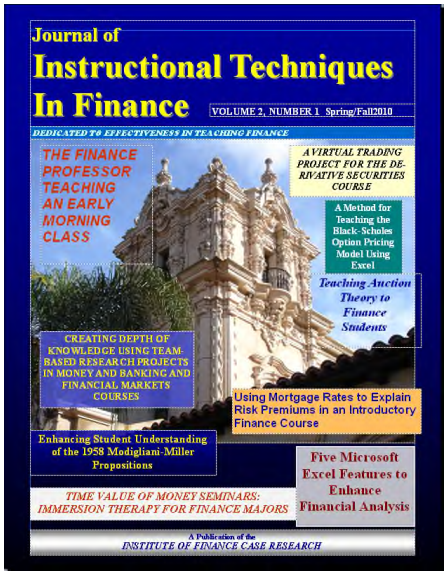

Journal of Instructional Techniques in Finance

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RECTICEL: FINANCING VIA A RIGHTS OFFERING

Nancy Huyghebaert, KU Leuven
Olga Kandinskaia, Cyprus International Institute of Management - CIIM

On a cold February morning in 2015, Jean-Pierre Mellen, the CFO of Recticel since 2002, was watching the heavy rain hitting the blue glass walls of the international headquarters building in Brussels. He thought of the challenging task that he had to handle: Recticel, the leading European manufacturer of polyurethane products, was in need of new capital. After poor accounting years in 2013 and 2014, the company was ready to 'turn the page' and implement an extensive investment program that would secure its market share and create the base for steady long-term growth. At the same time, Recticel needed to reduce its debt position. By the end of 2014, its interest-bearing debt had reached 194.93 million euros and its gearing ratio[1] had risen to 101.57%. Twenty months ago, the extraordinary General Shareholders' Meeting had granted permission to the Board of Directors to increase the company's share capital. This authorization was valid for three years until June 16, 2016. Mr. Mellen had been put in charge of the company's seasoned equity offering (SEO). He had to prepare the detailed implementation plan for this rights offering, which promised to be the largest capital increase in Belgium in 2015. He pondered what needed to be done:

"What story shall we offer to the shareholders to convince them to participate in our rights offering? Is it the right timing for an SEO? At what price can we offer the preferential rights, given our current stock market price of 4.25 euros? Will we have enough financial resources, including the net SEO proceeds, to finance the company's operations and investments in the coming two years? Which investment banks shall we choose to advise us on this transaction and what type of underwriting contract should we negotiate with those banks?"

COMPANY HISTORY

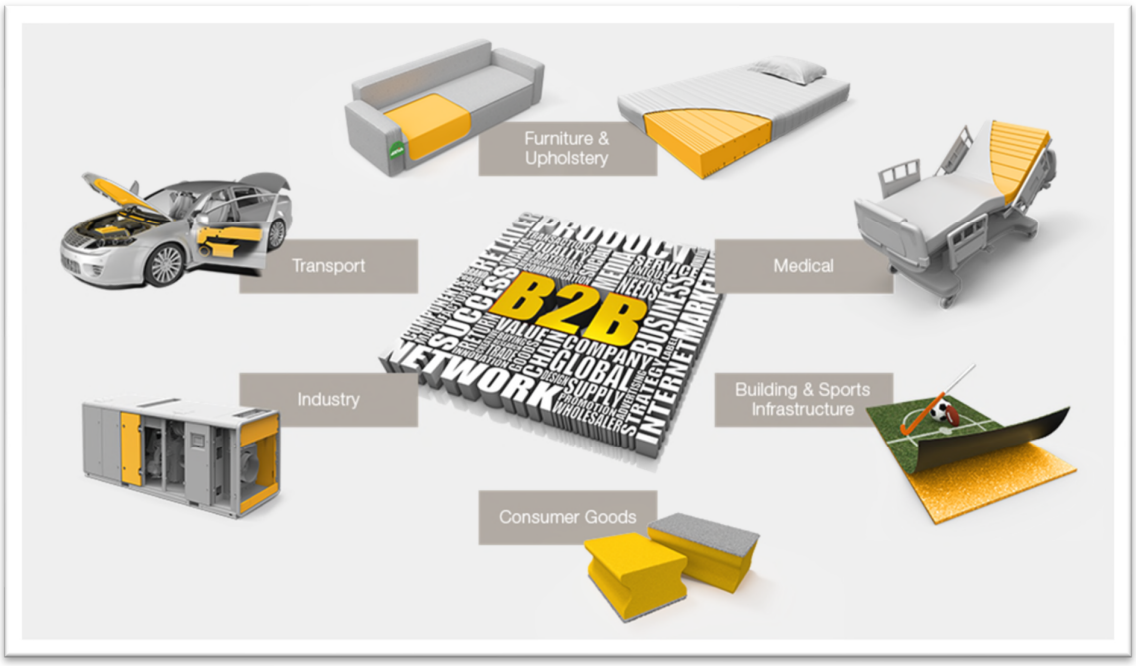
The history of the company went back to 1778, when it was founded by Jan-Frans Cooppal as *Koninklijke Buskruitfabriek Cooppal*, a gunpowder factory to supply the armies of Napoleon. After World War I, the company started to diversify, by adding synthetic and natural resins to its product portfolio; those products were used as raw materials in the paint and varnish industries. In the early 1950s, the company undertook its first steps in polyurethane (PU). André Belpaire, descendant of the founder and CEO at that time, was urging the company to try out several new products in order to replace the unstable base of gunpowder for corporate growth, particularly in peace times. PU was one of the only products that survived the evaluation process. PU indeed had some valuable material qualities, such as its density, elasticity, durability, limited weight, safety, design, and, of course, its attractive price.

In 1952, the company bought a license from Bayer for the production and marketing of polyurethane foam in order to further diversify. Afterwards, the company only had to work out applications for its new type of foam, which was called *Cooppalpren*. In the late 1950s, imitation sponges became the company's top product. In retrospect, Mr. Mellen realized that the constant search for new products, which had characterized the company in the 1950s, had continued in the years thereafter: "*The company continuously had to stay alert and reinvent itself in a market that was incessantly evolving*". At the beginning of the 1960s, the company introduced its polyether foam, which became increasingly used in the furniture industry. After the launch of its foam rolls in 1962, the company started the production of rigid foams in 1965.

From a financial point of view, it was not easy to keep up with all those new trends in the PU industry. In 1966, the Belpaire family, who had always refused to sell the company, decided to set up a 50/50 joint venture with the company PRB (Poudrerie Réunies de Belgique), in order to jointly finance the substantial investments in the PU industry. One year later, Cooppal and PRB merged into the PRB Group. From then onwards, Recticel, a small Dutch subsidiary in the PRB Group that was also active in polyurethane, gave its name to the Group's PU activities. Recticel continued to diversify its operations, introducing other technologies, products, and applications.

By 2015, PU foam – available either as a spray or as a rigid or flexible foam– was used in a large number of strongly diversified applications, such as filler for chairs and seat cushions, mattress centers, encapsulation of car windows, shoes, textiles, thermal insulation (buildings, refrigerators, etc.), sound insulation, adhesives and paints or coatings (see **Figure 1**).

Figure 1: Recticel's PU Foam Products



Source: https://www.recticel.com/business-lines/flexible-foams.html

Recticel could count some large premium-brand car producers, like BMW, Mercedes-Benz, and Volvo, among its customers. Mr. Mellen summarized the company's history as follows: "*Recticel had succeeded in leveraging its huge investments in PU technology to become a leading global provider of high value-added PU solutions for many applications*". Nonetheless, since PU was mainly used together with other materials, such as metal, textiles and wood, Recticel's products were not always visible in the end products. Also, Recticel still realized 94% of its sales in Europe, but considered the USA and Asia as attractive growth markets for its higher value-added products that addressed global customer demands. Consumers were becoming increasingly aware that the environment needed protection and that energy consumption has to be reduced. At the same time, their appetite for premium quality and comfort was rising. According to Mr. Mellen, Recticel had chosen not to shift its PU foam production to China, as PU production units in principle had to be located close to their end markets because of the high costs for transporting bulky, light-weight foam products.

RECTICEL'S ACCELERATED GROWTH IN 1998-2008

In 1998, when Société Générale de Belgique, a large investment company in Belgium and PRB's controlling shareholder at the time, wanted to get rid of its industrial activities, Luc Vansteenkiste, the then-CEO of Recticel, engaged in a management buyout of the company, financially sponsored by several investors, including Compagnie du Bois Sauvage. Bois Sauvage was pursuing investments in a limited number of companies from the industrial sector, trying to have a major influence on their strategy and management. Simultaneously, its investment strategy had to allow for a constantly increasing dividend for its own shareholders. Like Recticel, Bois Sauvage was publicly listed on NYSE Euronext Brussels; yet, 45.01% of its shares were controlled by Entreprises et Chemins de Fer en Chine, which represented a number of wealthy families in Belgium. Bois Sauvage, together with Entreprises et Chemins de Fer en Chine, still held a 28.71% stake in Recticel at the beginning of 2015. No other shareholder controlled more than 5% of Recticel's shares outstanding.

Under its new ownership, Recticel achieved success. Its new, highly innovative products resulted in the company's #1 ranking in Europe and #2 ranking worldwide (after the Vita Group) in polyurethane applications. And its intellectual capital was protected by about 80 patents. Recticel also increasingly embraced sustainability as a corporate goal in all of its business lines in order to create a significant competitive edge, foster further innovation, and reduce costs. As an example, it started to recycle foam waste from the conversion process and subsequently compounded it for use in other applications. In addition, Recticel continued to emphasize technological progress, superior product quality, and customer service. Recticel's combined sales experienced impressive growth: from 982 million euros in 1998 to 1,555 million euros in 2008, which translated into a compound annual growth rate (CAGR) of 4.70% over the ten-year period.

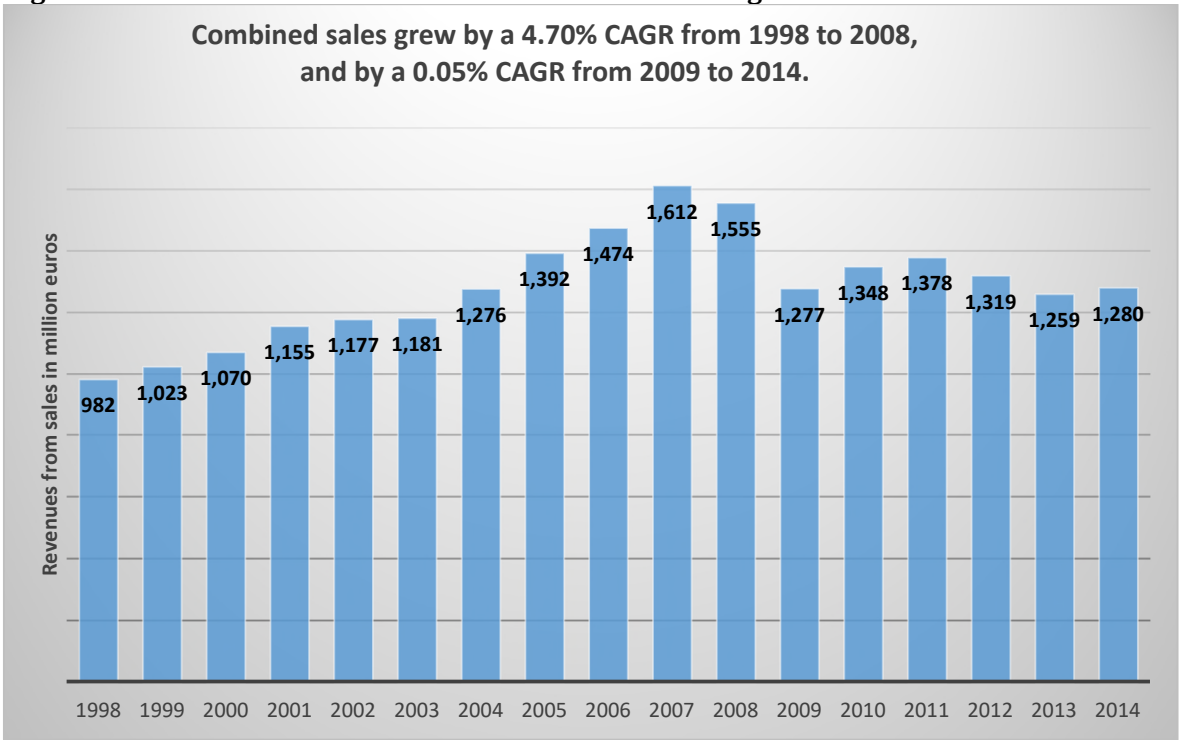
However, over time, and together with the growth, came the burden. *"By 2008, the company's complexity had increased a lot, with operations in 28 countries spread over 119 legal entities and stakes in 22 joint ventures. Moreover, all business units in the group benefited from a high degree of autonomy, which made it hard for the management to keep oversight,"* explained Mr. Mellen. He had joined Recticel in 2002, in the middle of the company's growth phase, after having worked as the Head of Group Corporate Finance & Group Treasury at Heidelberg Cement Group. *"By 2008, the company's net debt had increased to 268.86 million euros, mostly because of organic growth and acquisitions. Once Recticel's revenues from sales started to decline as a result of the worldwide economic crisis, the company was on the verge of breaking one of its major debt covenants, net debt/EBITDA."* To pay down part of its debts, Recticel decided to divest a joint venture. That event acted as a trigger for a strategic refocus: going forward, Recticel's strategic plan would prioritize resource allocation based on the relative attractiveness of end markets and the company's competitive strength in each market.

2009-2014: PERIOD OF REPAIR

In 2009, in part because of the worldwide economic crisis that had hit the car industry very hard, the company's combined sales dropped dramatically, to 1,277 million euros. In April 2010, Olivier Chapelle was appointed as Recticel's new CEO, while Luc Vansteenkiste, still an important shareholder, took up a position in the company's Board of Directors. The next five years could be described as the period of repair for Recticel. As shown in **Figure 2**, Recticel's combined sales amounted to 1,280 million euros in 2014. The compound annual growth rate (CAGR) in revenues from sales over the last five years thus equaled only 0.05%, i.e. there was virtually no growth. During the period 2010-2014, Recticel focused heavily on rationalization and cost savings, in order to eliminate inefficiencies and to simplify and streamline the Group. As a result, 31 locations were closed or sold, mostly in the European Union. The company's workforce was

reduced by about 2,400 people, to 7,578 by the end of 2014. In addition, the company was reorganized into four business lines: *Insulation*, *Bedding*, *Flexible Foams*, and *Automotive*, each of which relied on PU technology. At the same time, a number of corporate activities, like procurement, became centrally organized. This centralization allowed Recticel to realize substantial cost savings in the sourcing of chemical raw materials from big international players, like BASF. The company also centralized its transactional accounting services in a European Shared Service Center. **Exhibit 1** contains more detailed information on Recticel's new structure.

Figure 2: Recticel's Revenues from Combined Sales during 1998-2014



Source: Prepared by the authors based on the information used for the SEO prospectus

The global polyurethane applications market had amounted to 50 billion euros in 2014. It was characterized as a highly attractive, but also as a mature and competitive market, with even price erosion in the *Insulation* market segment. Moreover, the insulation market was highly fragmented, with few international and well-organized players. In *Automotive*, Recticel was dependent upon a limited number of very powerful customers. On the input side, the prices of its oil-based raw materials were subject to high volatility. Moreover, Recticel mainly relied on one supplier for its raw materials, BASF.

Although Recticel primarily produced semi-finished products (in its *Flexible Foams* and *Automotive* divisions), it also manufactured finished and durable goods for end users (in its *Insulation* and *Bedding* divisions). Particularly in the latter two business lines, the company had established valuable brand names. The *Insulation* division provided finished high-quality thermal insulation products that could be used in new building projects and renovations. Those insulation products were marketed under well-known brand names: *Eurowall*®, *Powerroof*®, *Powerdeck*®, *Powerwall*®, *Recticel Insulation*®. Likewise, mattresses and slat bases were marketed in the *Bedding* division under well-established brand names, such as *Beka*®, *Lattoflex*®, *Literie Bultex*®, *Schlaraffia*®, *Sembella*®, *Superba*®, *Swissflex*®; the company also expected a lot from its newly developed ingredient brand *GELTEX® inside*. In 2014, 58% of Recticel's sales in *Bedding* had been realized via branded products; private-label sales thus accounted for even 42%

of sales in this division. While significant differences existed among Recticel's various business lines, they also overlapped in a number of areas, which made the company an integrated whole. As an example, the *Bedding* and *Flexible Foams* divisions made use of the same production sites. *"The sharing of know-how and experience that arose as a result not only had allowed to realize cost savings, but also had led to valuable cross-fertilization throughout the whole organization,"* commented Mr. Mellen. Likewise, by exploiting product synergies between the *Insulation* and *Flexible Foams* divisions, Recticel had proved capable of introducing new products that combined acoustic and thermal insulation.

Figure 3: Recticel's Competitive Position in its Various Business Lines

Source: Prepared by the company for the SEO prospectus

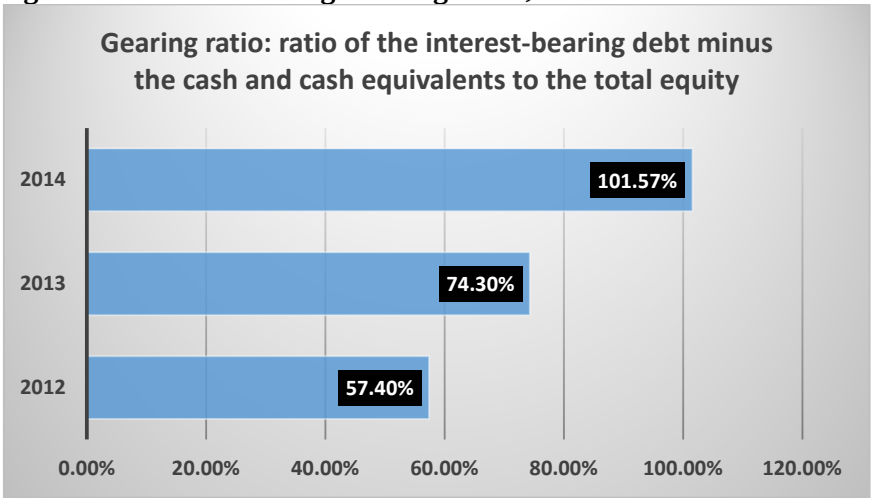
Figure 3 positions Recticel's four business lines based upon the attractiveness of end markets (horizontal axis) and Recticel's competitive position (vertical axis); this figure was at the heart of how the company had devised a strategy for each of its business lines. In *Insulation*, the company's focus indeed became on realizing growth, whereas its priority in *Bedding* and *Flexible Foams* was to improve profitability. For the *Automotive* division, which was significantly impacted by the worldwide economic crisis that had started in 2008-2009, Recticel sought to enhance profitability, yet at the same time the company no longer considered this division as 'core'. Mr. Mellen knew that it was available for sale at an attractive price. **Exhibits 2 and 3** contain the most recent financial information on Recticel over the period 2012-2014, on a consolidated basis and at the level of the company's various business lines, respectively. **Exhibit 4** shows the company's consolidated balance sheets over this same period.

ESCALATING DEBTS

Despite its strategic refocus, Recticel's problems were not over yet. On August 3, 2010, the European Commission (EC) held a raid in Recticel's corporate headquarters in Brussels. About three years later, Recticel announced that it had reached a settlement of 27.30 million euros with the EC for alleged cartel activities in the market of *Flexible Foams.*[2] Recticel obtained permission to pay its fine in three annual installments, in April 2014 (13.90 million euros), April 2015 (6.50 million euros), and April 2016 (6.90 million euros). In August 2014, Recticel announced that its German bedding affiliate, Recticel Schlafkomfort GmbH, reached a settlement with the German

Federal Cartel Office (FCO) in the framework of an FCO investigation into the German bedding market. Another 8.20 million euros had to be paid in full in September 2014. The total fines of about 35.50 million euros – which were not tax deductible – weighed heavily on the company, given that Recticel had realized a consolidated EBITDA of 36.79 million euros in 2014.

Figure 4: Recticel's Rising Gearing Ratio, 2012-2014



Source: Prepared by the authors based on the SEO prospectus

By December 31, 2014, Recticel's interest-bearing debt amounted to 194.93 million euros. Of this amount, 99 million euros was drawn from a revolving credit facility of 175 million euros. However, that line would expire in December 2016. As shown in **Figure 4**, Recticel's gearing ratio had risen from 57.40% in 2012 to 101.57% by the end of 2014. In addition, the company relied on various types of operating liabilities; the amount of total liabilities on its balance sheet had reached 471.64 million euros by the end of 2014. Finally, the company also made use of non-recourse off-balance sheet factoring, for a total amount of 62.71 million euros.

NEED FOR A CAPITAL INJECTION

By 2015, Recticel had developed a three-year extensive investment program of about 30 million euros per annum in order to secure its market share and create the base for a steady long-term growth. In 2014, the company had invested 33 million euros, and Recticel's historical data indicated that this number was not unusual. For the future, the company needed to invest in further streamlining the organization and reducing its industrial footprint. Other key elements of the investment plan were simplification, international expansion, and sustainability. The company had a highly experienced and committed management team to implement its investment strategy. What Recticel lacked was the necessary financing. Mr. Mellen added: *"The management felt that there was no room to further increase the company's debt position. Instead, we thought of a rights offering. The preferential rights issued to the company's existing shareholders would give those investors the right to buy first the newly issued shares at the SEO offer price, which would allow them to maintain their fractional ownership in the company. Nonetheless, those rights would also be transferable, allowing the company's shareholders to sell them on the open market."*

Twenty months earlier, on May 28, 2013, the Board of Directors had received an authorization at the extraordinary General Shareholders' Meeting to increase the company's share capital, in one or several offerings, with a total amount equivalent to the subscribed

capital. This authorization was valid for a term of three years, commencing from the date of the resolution's publication in the Annexes to the Belgian Official Gazette (Belgisch Staatsblad / Moniteur belge) on June 17, 2013, that is until June 16, 2016. Mr. Mellen's task was to prepare for the upcoming meeting of the Board on March 2, 2015 the detailed proposal for the authorized capital increase via a preferential rights issue, which would be executed subject to the company's entry into an underwriting agreement with a number of investment banks, as well as the effective number of new shares to be offered and the start and end date of the rights subscription period. The final SEO offer price would be set on the Board meeting of April 21, 2015, in consultation with the investment banks. All information would be communicated to the shareholders via the SEO prospectus. In Mr. Mellen's opinion, the prospectus had to start with a solid equity story to convince the shareholders – existing as well as potential new ones – to participate in the SEO. The company's strengths had to be highlighted and matched with the existing growth opportunities in the PU applications market, and at the same time, the company had to assess its internal weaknesses as well as the external threats to have the full trust of the shareholders. *"The key questions to answer via the SEO prospectus were the following: how will the capital increase help Recticel overcome its weaknesses, and what kind of opportunities will be open to the company,"* commented Mr. Mellen. *"Furthermore, it was important that the SEO prospectus elaborated on the consequences of a too high debt ratio, and thus send also the message to the shareholders that continuing to rely on the open credit lines had serious limitations."*

SEO TRANSACTION TERMS AND CONDITIONS

Mr. Mellen outlined the following key terms and conditions for the SEO transaction, to be proposed to the Board on March 2, 2015:

- The equity offering would be structured as an issue of new common shares with statutory preferential subscription rights for the company's existing shareholders.
- 4 new shares would be offered for each 5 existing shares.
- Existing shareholders could either exercise their rights or sell them on the open market.
- The reference shareholder (Compagnie du Bois Sauvage and Entreprises et Chemins de Fer en Chine), holding 28.71% of Recticel's shares, had already committed to exercise its rights for an amount equal to 28.71% of the offered shares.
- Unexercised preferential rights would be privately placed to qualified institutional investors in the European Economic Area (EEA); the net proceeds from this sale would be distributed proportionally between the holders of the unexercised preferential rights.
- The size of the offering would be up to a maximum of 75.95 million euros, represented by 23,733,804 new shares; the costs (fees) for the SEO were expected to equal about 3 million euros, reducing the net SEO proceeds to a maximum of 72.95 million euros.
- 50% of the net SEO proceeds would be used to optimize and refinance part of the company's current debt, more specifically to repay part of the revolving credit facility, and thus drastically reduce the company's gearing ratio.
- 25% of the net SEO proceeds would be invested in the coming year (2015) in expansion and modernization projects across the three core business lines (*Insulation*, *Bedding* and *Flexible Foams*).
- 25% of the net SEO proceeds would be used to finalize the streamlining of Recticel's industrial footprint and organization (2015-2017), in order to reach an optimal supply chain and to further strengthen the production synergies within the company.
- The subscription period would start on April 23, 2015 and would end on May 7, 2015 (inclusive); the unexercised subscription rights would be sold on May 11, 2015; the new shares would start trading on May 13, 2015.

In addition, Mr. Mellen planned to propose that the dividend rights of the company's existing shares would be separated from those shares on April 22, 2015, after the closing of the stock market. Correspondingly, only the company's pre-SEO shareholders would be entitled to receive a dividend in 2015. Given the importance that the company (and its reference shareholder) attached to a stable dividend, Mr. Mellen expected to maintain the 2015 dividend at last year's value of 0.20 euros per share.

To anticipate questions on the timing of the SEO, Mr. Mellen collected some data on the recent evolution of major stock market indices in Belgium (BEL 20 and BASI) and Europe (STOXX 600 and FTSE 100), stock market volatility, and Recticel's share price relative to the Belgian leading stock market index BEL 20 (see **Exhibits 5-7**).

VALUATION

Mr. Mellen also had to reflect on the intrinsic value of Recticel's shares and compare it to their stock market price in order to decide on the SEO timing: "*Was the stock appropriately priced in financial markets?*" On February 3, 2015, the company's stock was trading at a price of 4.25 euros per share (29,667,256 shares outstanding). To answer this valuation question, Mr. Mellen decided to determine Recticel's share value by means of the discounted cash flow (DCF) model.

To implement the DCF valuation, Mr. Mellen would forecast the company's free cash flows (FCFs) over a pre-specified horizon, apply a long-term growth rate to estimate value beyond the horizon, and discount all the FCF components in the valuation at the company's weighted average cost of capital (WACC). Mr. Mellen planned to forecast the company's FCFs over a three-year horizon, for each of the four business lines separately, and then apply a long-term growth rate to the aggregate FCF in the last forecasting year in order to obtain the company's continuing value at the end of 2017. Given the company's CAGR of 0.05% over the last five years, he considered this rate as a good starting value for the long-term growth rate in FCFs, but decided that he would check the sensitivity of his valuation to other long-run growth estimates. For one thing, inflation in the Eurozone was expected to equal 2% per annum. in the long run, given the ECB's monetary policy. Nonetheless, inflation rates in more recent years had been much lower. Moreover, some of Recticel's products were suffering from price erosion, particularly in the *Insulation* division.

Next, Mr. Mellen planned to integrate the segment and consolidated accounting information that was readily available over the 2012-2014 period. Mr. Mellen indeed had realized that the consolidated (**Exhibit 2**) as well as the business-line (**Exhibit 3**) data contained interesting pieces of information for his valuation model. While the segment data provided the highly detailed information on each line's historical growth and profitability, those data could not just be added up to find the consolidated information because that would double-count the intragroup transactions among Recticel's various divisions. Moreover, those segment data, when combined, did not yet account for the company's transactions with its various joint ventures. While the consolidated data did comprise those activities, Mr. Mellen also had to consider that Recticel had changed its financial reporting method for joint ventures from proportionate consolidation to the equity method as of January 1, 2014, following its mandatory adoption of IFRS11.[4] Nonetheless, Recticel's consolidated financial statements for previous years had been redrafted using this equity method, to facilitate the comparison of accounting data from before to after 2014. For the year 2014, the accounting data revealed that Recticel's consolidated revenues from sales of 983.37 million euros were about 28% lower than the sum of the sales by the four business lines (= 1,365.60 million euros). For the years 2012-2014, this average difference was 26.70%. Mr. Mellen therefore planned to make a similar correction for intragroup transactions and joint ventures when translating his sales

forecasts for Recticel's various business lines into a sales forecast for the company as a whole. So, he would use a 'conversion rate' of 73.30% (= 100% – 26.70%).

To set up a valuation model for each business line, Mr. Mellen started by forecasting each line's revenues from sales and REBIT (i.e. recurrent earnings before interest expenses and taxes). In the recent past, Recticel indeed had recorded a number of exceptional costs, which clearly were not repetitive and therefore should not be retained in any FCF forecast for the future. For example, in 2014, it had recognized impairment losses of 0.68 million euros that were mainly related to its idle plant in Legutiano, Spain (*Flexible Foams*). In contrast, the 2013 value-in-use impairment losses were mostly related to the Rheinbreitbach plant in Germany (*Automotive*). Moreover, the 2013 other operating expenses exceptionally included provisions for the EC antitrust-related fines, whereas the 2014 operating expenses included the FCO fines.

For each business line, Mr. Mellen considered extrapolating the line's average sales growth rate over the period 2012-2014 as a good starting point (**Exhibit 3**). However, for *Automotive*, he felt that it was better to start from zero projected future sales growth, given the company's strategic view vis-à-vis that division. Next, to compute profits, Mr. Mellen intended to rely on each line's most recent REBIT margin (**Exhibit 3**). He further expected that those REBIT margins could still improve somewhat, particularly in the *Bedding* and *Flexible Foams* divisions, as Recticel would focus on additional streamlining. For *Bedding*, a gradual increase in the REBIT margin from 2.56% in 2014 to 3.00% in 2017 seemed achievable. For *Flexible Foams*, Mr. Mellen considered a gradual improvement from 2.78% in 2014 to 3.20% in 2017 as realizable. Finally, to obtain an estimate of the company's non-cash expenses and capital expenditures, Mr. Mellen found the historical segment data in **Exhibit 3** highly informative as well. By computing the difference between each line's REBITDA and REBIT margins, he would be able to identify that line's non-cash expenses. As regards the company's planned investments, Mr. Mellen believed that the most recent data of 2014 (**Exhibit 3**) provided a good starting point for forecasting any further investments in streamlining. However, for the *Automotive* business line, he felt that he should not use a larger investment rate than the depreciation rate, which was 4.05% in 2014, to reflect that the company would only make the necessary replacement investments. Indeed, Recticel's focus in *Automotive* had become to fully leverage that division's existing production capacity, while keeping investments under control. On top of the above planned investments, about 25% of the net SEO proceeds (or up to 18.24 million euros) would be used to finance extra investments in 2015 in order to expand and modernize the insulation factory in Wevelgem, Belgium. In addition, this amount would be used to increase the company's *Flexible Foams* capacity in Romania and to expand its foam-converting operations in the USA.

Next, Mr. Mellen had to reflect on the extra investment in net working capital (NWC) that would be needed as the company was growing. His calculations for the year 2014 had revealed that an extra 7.97 eurocents were needed in operating NWC to support an extra euro of sales:

Operating NWC in 2014 = Inventories and WIP + Trade receivables – Trade payables
= 96.63 + 78.11 – 96.37 = 78.37 million euros

Sales in 2014 = 983.37 million euros

Hence, 78.37/983.37 = 7.97%

When implementing these same calculations for the years 2012 and 2013, Mr. Mellen obtained an operating NWC to sales ratio of 8.05% and 7.87%, respectively. From this extra analysis, he concluded that the estimate of 7.97% for investments in operating net working capital based upon the accounting year 2014 was a defensible choice.

However, Mr. Mellen felt less sure about how he would have to account for any tax effects in his valuation model. Specifically, while Mr. Mellen was well aware of the 33.99%

statutory corporate tax rate in Belgium, he also had computed that Recticel had effectively paid taxes at a rate of only 25% in accounting year 2014. One of the reasons for this was that the company did not realize all its income in Belgium.

The above information is summarized in **Table 1** below.

Table 1: Summary of Inputs for the Business Lines in the DCF Valuation Model

	Segments				
	Insulation	**Bedding**	**Flex. Foams**	**Automotive**	**Total**
Consolidated sales in 2012 (in million)	-	-	-	-	€ 1,035.05
Consolidated sales in 2013 (in million)	-	-	-	-	€ 976.76
Consolidated sales in 2014 (in million)	-	-	-	-	€ 983.37
Sales by business lines (in million)					
2012	€ 220.70	€ 276.50	€ 588.30	€ 289.70	€ 1,375.20
2013	€ 220.00	€ 283.00	€ 583.40	€ 258.40	€ 1,344.80
2014	€ 227.00	€ 281.60	€ 593.00	€ 264.00	€ 1,365.60
Conversion factor: proportion of consolidated sales to total sales by the four business lines					73.30%
Sales growth rates (in %)					
Sales growth in 2013	-0.32%	2.35%	-0.83%	-10.80%	
Sales growth in 2014	3.18%	-0.49%	1.65%	2.17%	
Average historical growth of sales	1.43%	0.93%	0.41%	-4.32%	
Expected sales growth in 2015–2017	1.43%	0.93%	0.41%	0.00%	
Margins (in %)					
REBITDA margin for 2014	11.94%	4.79%	4.67%	5.64%	
REBIT margin for 2014	9.30%	2.56%	2.78%	1.59%	
Assigned REBIT margins for 2015–17 if different from 2014:					
2015	-	2.71%	2.92%	-	
2016	-	2.85%	3.06%	-	
2017	-	3.00%	3.20%	-	
Non-cash expenses for 2014 as % of sales	2.64%	2.23%	1.89%	4.05%	
Investments for 2014 as % of sales	2.73%	1.24%	1.74%	4.92%	
Planned investments for 2015–17 as % of sales	2.73%	1.24%	1.74%	4.05%	
Operating NWC to consolidated sales	7.97%				
Corporate tax rate					
Long-term growth rate of FCFs after 2017	0.05%				
Cost of capital (WACC)					

Source: Prepared by the authors based on the information from the case

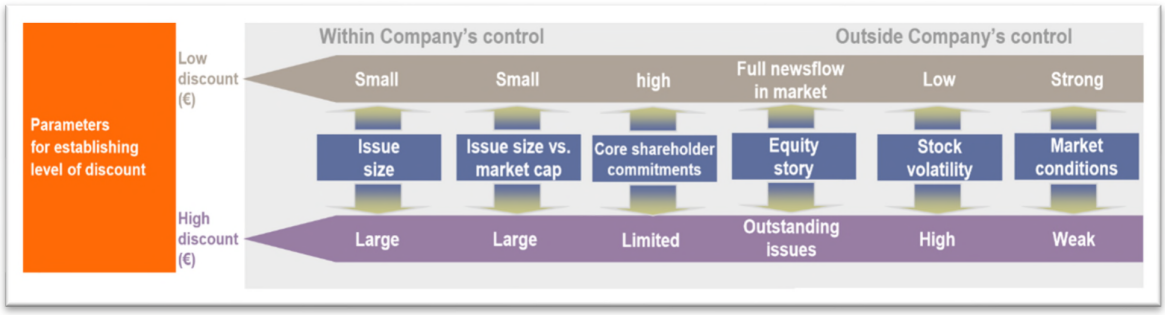
As to the company's weighted average cost of capital (WACC), Mr. Mellen estimated it at 8.83%. In his computations, he recognized that the company had a long-term target capital structure that included 67% of equity and 33% of debt finance. To determine the company's cost of equity, Mr. Mellen started from the CAPM, adding a risk premium to the risk-free rate. On February 3, 2015, the yield on Belgian government bonds with a ten-year maturity amounted to 0.60%. As regards the long-term risk premium for stock investments, Mr. Mellen considered an equity risk premium of 5% as appropriate for the time being. To capture the company's systematic risk (equity beta), Mr. Mellen decided that 1.35 was a correct value for the future. Finally, he also added a small-cap premium, to obtain an estimate of 13% for the cost of equity. To determine the company's cost of debt, Mr. Mellen inferred that interest expenses in 2014 had represented 5.06% of total debt finance. Recticel's income statement for

2014 indeed showed 9.87 million euros in interest expenses (after removing the net interest charges on currency swaps of 1 million euros from the financial expenses), while its balance sheet revealed 194.93 million euros in debt finance. Mr. Mellen decided that he would check the sensitivity of his valuation outcome to other estimates for the company WACC.

SIZE OF THE SEO DISCOUNT & UNDERWRITING AGREEMENT

"One of the critical issues for me was to assess the size of the discount that would be applied to the new shares given Recticel's stock market price of 4.25 euros," commented Mr. Mellen, *"And of course how the SEO transaction terms would potentially impact the company's stock price as a result."* One of the investment banks, ING, had already provided Mr. Mellen with an overview of the parameters that were considered to influence the level of the SEO discount **(Figure 5**).

Figure 5: Parameters for Establishing the Level of the SEO Discount



Source: Prepared by the authors from information provided by an investment bank.

In addition, Mr. Mellen received the data for 13 SEO transactions by industrial listed companies in Belgium during the period 2009-2014 from that investment bank (**Exhibit 8**), in order to help him assess the size of the SEO discount. Specifically, ING provided him with the following information:

- the SEO date (month/year)
- the SEO amount (in million euros)
- the ratio of new shares to existing shares
- the SEO offer price, i.e. the subscription price
- the share price at t-1, i.e. the share price before the SEO
- the discount to share price, by comparing the SEO offer price with the share price at t-1
- the TERP, i.e. the theoretical ex-rights price[5]
- the discount to TERP, by comparing the SEO offer price with the TERP
- the type of underwriting contract

When it came to choosing the Global Coordinators and Joint Bookrunners for the SEO, Mr. Mellen's intention was to rely on the four investment banks which had previously worked with Recticel and which knew the company very well. Those four banks (and their stakes in the SEO) would be: ING (30%), KBC Securities (30%), BNP Paribas Fortis (30%), and Bank Degroof (10%). They all had substantial expertise in capital market transactions with a size similar to Recticel's. In addition, those four banks had financial analysts who were ensuring research coverage for Recticel's stock. *"Having those banks, who know the company quite well, supporting Recticel's SEO will send the right signal to stock market investors,"* argued Mr. Mellen. Moreover, those banks had access to the most important investors that

Recticel aimed to target with its SEO, i.e. investors in Belgium and in the European Economic Area (EAA). Indeed, the company was not aiming to distribute its shares among investors in the USA or in Asia and hence it seemed less necessary to involve a globally operating investment bank like Morgan Stanley or Goldman Sachs. However, Mr. Mellen wondered about this, given that Recticel also had identified the USA and Asia as potentially important growth markets. *"I felt however that the banks in the syndicate were quite complementary. ING, KBC Securities, and BNP Paribas Fortis had a network of bank offices in Belgium/Europe, which would allow to reach the retail investors, while Bank Degroof was a niche bank, yet having exceptional access to wealthy individuals and large institutional investors in Belgium,"* explained Mr. Mellen.

As regards the type of underwriting agreement with the investment banks, Mr. Mellen would have to choose between a *hard* underwriting contract (i.e., an 'insured' contract), in which the banks in the syndicate would insure the offering by committing to buy up all the non-sold shares, or a *soft* underwriting contract (i.e., an 'uninsured' contract), in which the banks would only ensure that the investors who ordered shares actually paid for their requested shares. (In practice, this could be realized by asking those investors to put the money aside on a blocked account.) So, in a *soft* underwriting contract, the banks would only commit themselves to try to place the shares at the SEO offer price without actually guaranteeing the entire sale of all shares. In other words, this would be a *best-efforts contract*. In contrast, in a *hard* underwriting contract, the investment banks would actually engage in a *firm-commitment contract*, which could be considered and valued as a put option. Indeed, the hard underwriting contract would give Recticel the right to sell the newly issued shares at the SEO offer price to the investment-bank syndicate when market demand was too low. Mr. Mellen wondered what the value of such a put option for Recticel would be, given Recticel's 30.89% historical standard deviation of stock returns. On February 3, 2015, the short-term risk-free rate amounted to -0.14% per annum. *"Is it worth paying an extra fee to the banks to receive from them the insurance for this SEO transaction?"*.

CONCLUSION

Mr. Mellen had many issues to finalize for the SEO prospectus and the upcoming meeting of the Board of Directors on March 2, 2015. With his MBA background and his vast experience in the manufacturing industry, Mr. Mellen had learned that it was crucial to be well prepared for a major corporate finance transaction like this. The company's future was at stake as well as his personal career. He wanted to make sure that this rights offering would be appropriately priced, at a reasonable discount, which could help building support for it with Recticel's controlling shareholder as well as with stock market investors.

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Exhibit 1: Recticel's Structure (at the End of 2014)

Recticel is organized in four business lines:

The Insulation business line concentrates on the production and commercialization of sustainable thermal insulation material in rigid closed cell polyurethane and polyisocyanurate foam for the construction sector. Although it is the smallest in the Group in terms of sales figures, the insulation business line provides the greatest potential for growth today, given key worldwide trends like environment protection and energy conservation.

The Bedding business line focuses on the development, production and the commercialization of fully finished mattresses, slats and bed bases, and beds in particular. As a consequence, this business line has a distinct business-to-consumer character. In this line, Recticel wishes to stand out by means of a strong brand policy (e.g., *GELTEX® inside* and *Bultex®*).

The Flexible Foams business activities focus mainly on the production, transformation and commercialization of predominantly semi-finished products in flexible polyurethane foam. Historically, this business line has been the largest within the Group and it consists of three sections today: Comfort, Technical Foams and Composite Foams. The characteristic properties of the foam types, the uniqueness of the production process and/or the typical application options of the foam primarily determine this classification.

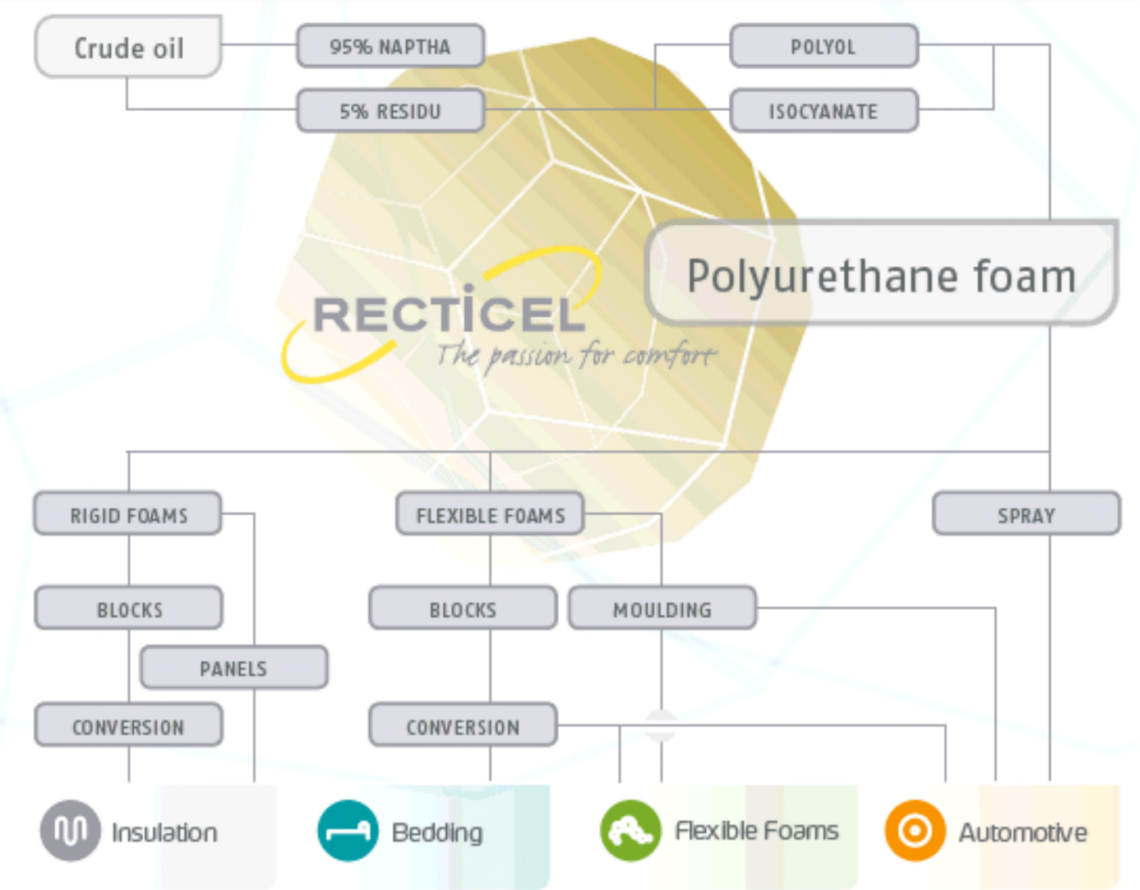
The Automotive business line includes the following activities:

RECTICEL AUTOMOTIVE which develops, produces and commercializes interior solutions (e.g., dashboard skins) on the basis of the unique *Colo-Fast®* spray technology.

PROSEAT, a 51/49 joint venture between Recticel and Woodbridge, which produces seating pads in cold moulded foam.

INTERIORS which is a small division that mainly concentrates on the production of the light-stable polyurethane raw material *Colo-fast®* (compounds).

Each of these business lines relies upon the same polyurethane technology:



Source: Prepared by the company for the SEO prospectus

Exhibit 2: Recticel's Consolidated Income Statement, 2012-2014

	31 December 2014	31 December 2013	31 December 2012
in million €			
Sales	**983.37**	**976.76**	**1035.05**
Distribution costs	-54.13	-52.93	-54.46
Cost of sales	-757.03	-756.92	-809.87
Gross profit	**172.21**	**166.91**	**170.72**
General and administrative expenses	-72.30	-74.40	-66.77
Sales and marketing expenses	-73.26	-64.52	-65.80
Research and development expenses	-13.28	-14.18	-12.94
Impairments	-0.68	-3.37	-1.11
Other operating result	-12.87	-31.77	2.87
Income from joint ventures and associates	8.96	0.44	6.01
Income from investments	0	0	0
EBIT	**8.78**	**-20.89**	**32.98**
Interest income	0.61	0.76	0.95
Interest expenses on the interest-bearing borrowings*	-10.87	-10.41	-10.65
Other financial expenses	-2.57	-1.69	-1.89
Financial result	**-12.83**	**-11.34**	**-11.59**
Result of the period before taxes	**-4.05**	**-32.23**	**21.39**
Income taxes	-5.70	-3.91	-6.04
Result of the period after taxes	**-9.75**	**-36.14**	**15.35**

* Unlike the published financial statements, the net interest charges on foreign currency swaps have now been grouped together with the other financial expenses

Source: Prepared by the authors from the company's financial reports

Exhibit 3: Recticel's Financial Information per Business Line, 2012-2014

INSULATION:			
	31 December	**31 December**	**31 December**
Combined figures	**2014**	**2013**	**2012**
in million €			
Sales	**227.0**	**220.0**	**220.7**
REBITDA	**27.1**	**27.7**	**36.0**
as % of sales	*11.94%*	*12.59%*	*16.31%*
REBIT	**21.1**	**22.0**	**32.0**
as % of sales	*9.30%*	*10.00%*	*14.50%*
EBIT	**21.1**	**21.9**	**31.8**
as % of sales	*9.30%*	*9.95%*	*14.41%*
Investments	**6.2**	**4.8**	**25.9**
as % of sales	*2.73%*	*2.18%*	*11.74%*
BEDDING:			
	31 December	**31 December**	**31 December**
Combined figures	**2014**	**2013**	**2012**
in million €			
Sales	**281.6**	**283.0**	**276.5**
REBITDA	**13.5**	**12.8**	**13.9**
as % of sales	*4.79%*	*4.52%*	*5.03%*
REBIT	**7.2**	**6.3**	**8.4**
as % of sales	*2.56%*	*2.23%*	*3.04%*
EBIT	**-3.5**	**3.8**	**6.5**
as % of sales	*-1.24%*	*1.34%*	*2.35%*
Investments	**3.5**	**1.7**	**3.8**
as % of sales	*1.24%*	*0.60%*	*1.37%*
FLEXIBLE FOAMS:			
	31 December	**31 December**	**31 December**
Combined figures	**2014**	**2013**	**2012**
in million €			
Sales	**593.0**	**583.4**	**588.3**
REBITDA	**27.7**	**30.3**	**29.2**
as % of sales	*4.67%*	*5.19%*	*4.96%*
REBIT	**16.5**	**18.0**	**15.6**
as % of sales	*2.78%*	*3.09%*	*2.65%*
EBIT	**13.2**	**-16.4**	**9.0**
as % of sales	*2.23%*	*-2.81%*	*1.53%*
Investments	**10.3**	**11.0**	**10.9**
as % of sales	*1.74%*	*1.89%*	*1.85%*

AUTOMOTIVE:			
	31 December	**31 December**	**31 December**
Combined figures	**2014**	**2013**	**2012**
in million €			
Sales	**264.0**	**258.4**	**289.7**
REBITDA	**14.9**	**18.8**	**24.2**
as % of sales	*5.64%*	*7.28%*	*8.35%*
REBIT	**4.2**	**4.8**	**8.2**
as % of sales	*1.59%*	*1.86%*	*2.83%*
EBIT	**1.8**	**-5.3**	**6.0**
as % of sales	*0.68%*	*-2.05%*	*2.07%*
Investments	**13.0**	**9.3**	**6.3**
as % of sales	*4.92%*	*3.60%*	*2.17%*

Source: Prepared by the authors from the company's financial reports

Exhibit 4: Recticel's Consolidated Balance Sheet, 2012-2014

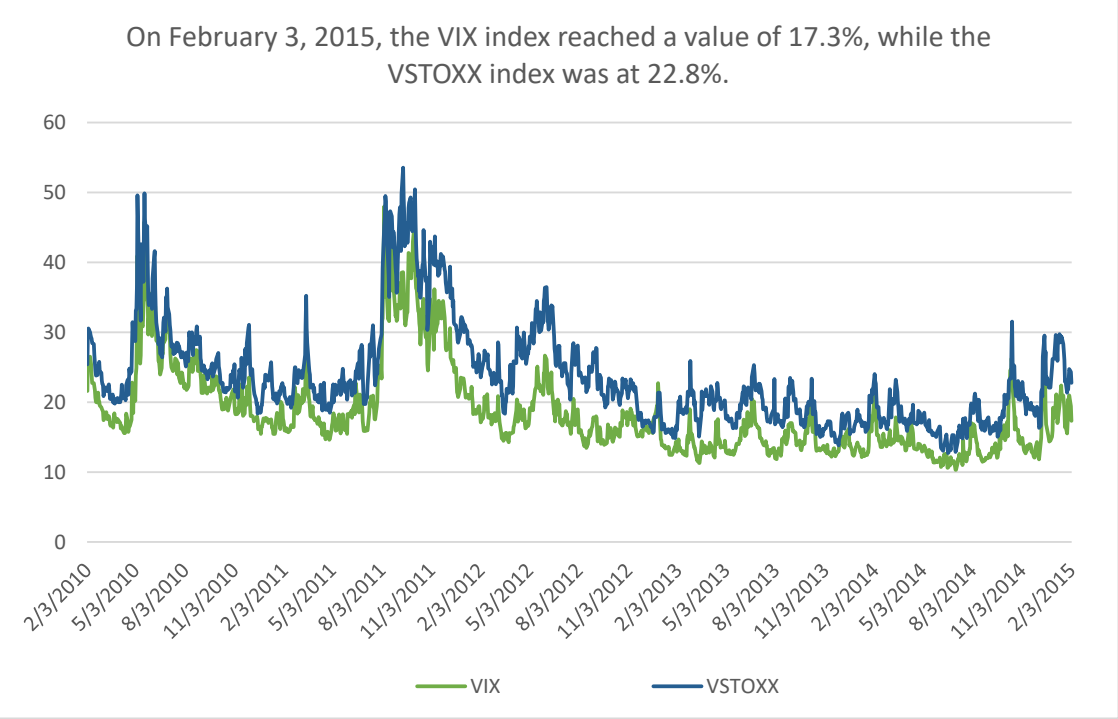
	31 December	31 December	31 December
in million €	**2014**	**2013**	**2012**
ASSETS			
Intangible assets	12.38	11.95	11.15
Goodwill	24.95	24.61	25.11
Property, plant & equipment, net	202.73	204.61	219.18
Investment property	3.31	3.33	4.45
Interest in joint ventures and associates	73.65	72.51	69.12
Other financial investments and available for sale investments	0.93	0.44	0.35
Non-current receivables	13.37	10.97	10.15
Deferred taxes	46.83	48.93	49.53
Non-current assets	**378.15**	**377.35**	**389.04**
Inventories and contracts in progress	96.63	94.03	91.03
Trade receivables	78.11	64.52	78.36
Other receivables	49.60	46.35	56.53
Income tax receivables	0.50	3.85	3.78
Available for sale investments	0.08	0.06	0.00
Cash and cash equivalents	26.16	26.24	18.53
Disposal group held for sale	8.57	0.00	0.00
Current assets	**259.65**	**235.05**	**248.23**
TOTAL ASSETS	**637.80**	**612.40**	**637.27**
LIABILITIES			
Equity (share of the Group)	166.16	186.76	241.09
Non-controlling interests	0.00	0.00	0.00
Total equity	**166.16**	**186.76**	**241.09**
Pensions and other provisions	61.85	52.71	53.98
Deferred taxes	8.91	8.20	7.26
Interest-bearing borrowings	142.13	98.83	120.46
Other amounts payable	6.81	0.44	0.70
Non-current liabilities	**219.70**	**160.18**	**182.40**
Pensions and other provisions	6.89	8.54	2.66
Interest-bearing borrowings	52.80	66.18	36.45
Trade payables	96.37	81.72	86.07
Income taxes payable	0.41	3.09	2.07
Other amounts payable	95.47	105.93	86.53
Current liabilities	**251.94**	**265.46**	**213.78**
TOTAL LIABILITIES & EQUITY	**637.80**	**612.40**	**637.27**

Source: Prepared by the authors from the company’s financial reports

Exhibit 5: Evolution of Major Stock Market Indices over Feb. 2010-Feb. 2015 (Indexed at a starting value of 100)

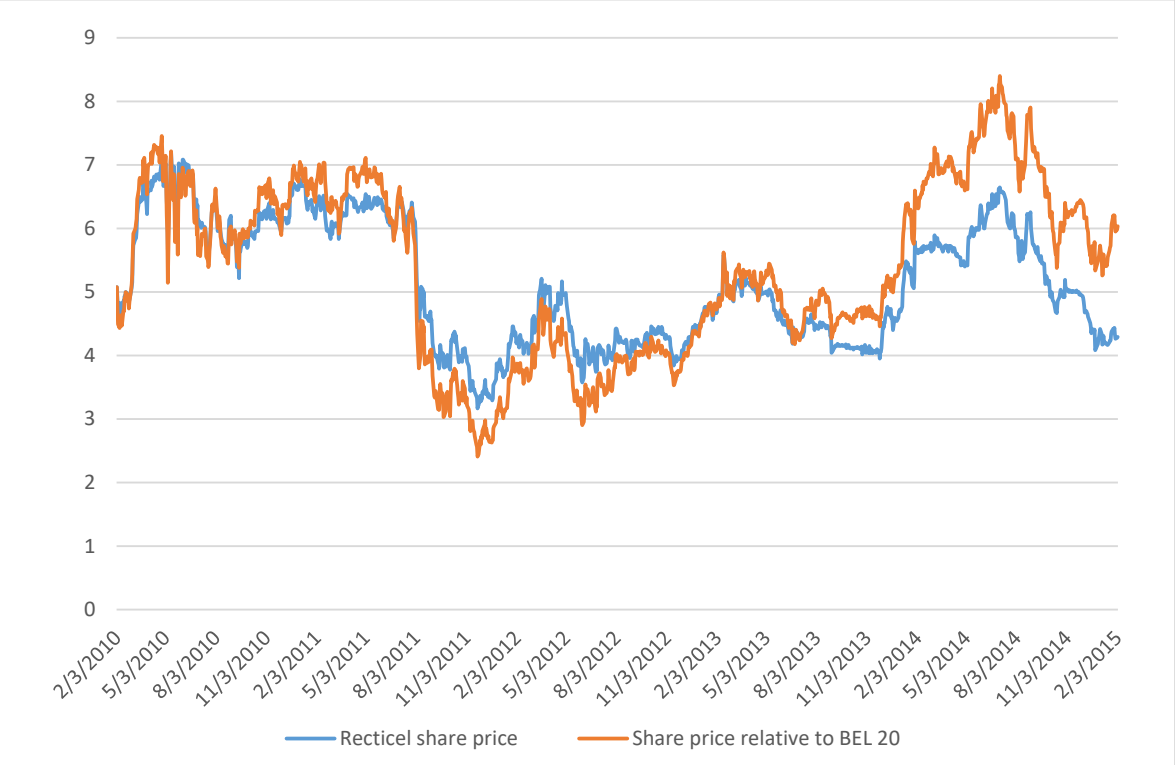
Source: Prepared by the authors from data available in the Thomson Eikon database

Exhibit 6: Evolution of Stock Market Volatility over Feb. 2010-Feb. 2015



Source: Prepared by the authors from data available in the Thomson Eikon database

Exhibit 7: Evolution of Recticel's Share Price (in absolute terms and relative to BEL 20) over Feb. 2010-Feb. 2015



Source: Prepared by the authors from data available in the Thomson Eikon database

Exhibit 8: Discounts on Prior SEO Transactions by Industrial Listed Firms in Belgium

	SEO date	SEO amount (million euros)	Ratio	SEO offer price (euros)	Share $price_{t-1}$ (euros)	Discount to price	TERP (euros)	Discount to TERP	Under-writing contract
Picanol	Jun/09	15	2 for 1	1.3	4.0	68.6%	2.2	42.1%	Soft
Deceuninck	Sep/09	85	4 for 1	1.0	3.3	70.2%	1.4	32.0%	Hard
Exmar	Nov/09	100	2 for 3	4.2	8.7	51.4%	6.9	38.9%	Hard
Punch	Dec/09	20	4 for 1	2.1	6.1	65.0%	2.9	27.1%	Soft
Option	Dec/09	20	1 for 1	0.5	1.4	64.2%	0.9	47.3%	Soft
Elia	Jun/10	300	1 for 4	24.8	26.2	5.5%	26.0	4.4%	Soft
Agfa	Nov/10	148	1 for 3	3.5	5.2	34.2%	4.8	28.0%	Hard
Nyrstar	Feb/11	490	7 for 10	7.0	11.5	39.3%	9.7	27.6%	Hard
Tigenix	May/11	15	1 for 5	1.0	1.3	21.3%	1.2	14.1%	Soft
Fountain	Apr/14	5	3 for 2	2.0	4.0	50.1%	2.8	28.6%	Soft
Zenitel	Jun/14	13	1 for 1	0.8	1.0	18.4%	0.9	10.1%	Soft
Nyrstar	Sep/14	252	1 for 1	1.5	2.9	49.0%	2.2	32.4%	Hard
Tessenderlo	Dec/14	175	1 for 3	16.5	21.8	24.3%	20.5	19.4%	Soft
Average						**43.2%**		**27.1%**	
Median						**44.2%**		**27.8%**	

Source: Prepared by the authors from data provided by an investment bank.

NOTES

[1] Ratio of the interest-bearing debt minus the cash and cash equivalents to the total equity.
[2] The European Commission had inferred that the four major producers of flexible PU foam – Vita, Carpenter, Recticel, and Eurofoam – had participated in a cartel. As documented in the EC Press Release (January 29, 2014), "*The companies had colluded to coordinate the sales prices of various types of foam for nearly five years, from October 2005 until July 2010, in ten EU Member States*." Vita was not fined as it benefited from immunity under the Commission's 2006 Leniency Notice for revealing the existence of the cartel to the EC. Eurofoam (a joint venture between Recticel and Greiner Holding AG), Recticel, and Greiner received a 10% reduction of their fines for their cooperation in the investigation under the Commission's leniency program.
[3] In non-recourse factoring, a company sells its accounts receivable to a factor, which then supplies the cash to cover the corresponding invoices. This factoring company also absorbs the risk of customer default in case the contract has a non-recourse nature. Recticel only relied on such a factoring program for its receivables in Belgium, France, Germany, the Netherlands, and the UK.
[4] A joint venture is a type of business agreement involving two or more parties that group their available resources into a common undertaking. *Joint* control is a requirement for an arrangement to be considered as a joint venture. A jointly controlled entity controls the assets of the joint venture, incurs liabilities and expenses, and earns a net income. It may enter into contracts in its own name and raise finance for the purposes of the joint venture activity. Each party in the joint venture is entitled to receive a fraction of the jointly controlled entity's profits (i.e. earnings). The equity method of accounting – which is known as 'one-line consolidation' in the USA – requires that each party's consolidated income statement reveals this fractional income as a separate line item. In addition, any sales transactions among a party and its joint venture are to be removed from that party's consolidated sales numbers, in order to avoid double counting of sales revenues. Finally, the investment in the joint venture is to be recorded at historical cost on the balance sheet. Adjustments are to be made to this amount, depending on the party's share of profits/losses. Also, any dividends received from the joint venture should be deducted from the investment amount.
[5] The theoretical ex-rights price (TERP) is the price at which a stock should trade following a rights offering. It can be computed by adding the market value of all shares outstanding prior to the offering and the proceeds raised through the offering. This number is then divided by the total number of shares after the offering. More information on rights offerings can be found in the study by Slovin, Sushka and Lai (2000).

JACKPOT! A BEHAVIORAL ANALYSIS

Colleen Tokar Asaad
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Everyone around the office is talking about it.
There was not a winner for last week's drawing.
The jackpot will increase again.
That amount of money would be life changing.
You can't stop dreaming about the possibilities.
Driving home from work, you stop to purchase a lottery ticket.

Jackpot! You won! Do you take the lump sum or the annuity payments? To make an informed decision, consider time value of money calculations, taxes, behavioral influences, life goals and happiness.

LOTTERY BACKGROUND

What is a lottery?

Lot'-ter-y
noun
a means of raising money by selling numbered tickets and giving prizes to the holders of numbers drawn at random

Lotteries are one of the most popular forms of gambling (Gillespie, 1999). Games include instant-win scratch-off as well as draw games, progressive jackpot games, and others. Participants purchase tickets with, in the words of Adam Smith (2010), "the vain hope of gaining some of the great prizes."

State lotteries are a large source of revenue. In some states, lotteries provide more revenue than the corporate state income tax (Johnston, 2011). New Hampshire was the first state to establish a state lottery in 1964. As of 2018, forty-five states, as well as the District of Columbia, Puerto Rico, and the U.S. Virgin Islands, have lotteries. However, lotteries have a long history. They were used to raise funds in colonial America (Millikan, 2011). Lotteries were also used in ancient Rome and Renaissance Europe (Josephson, 2019).

In addition to state lotteries, there are multi-state lotteries such as *Mega Millions* and *Powerball*.

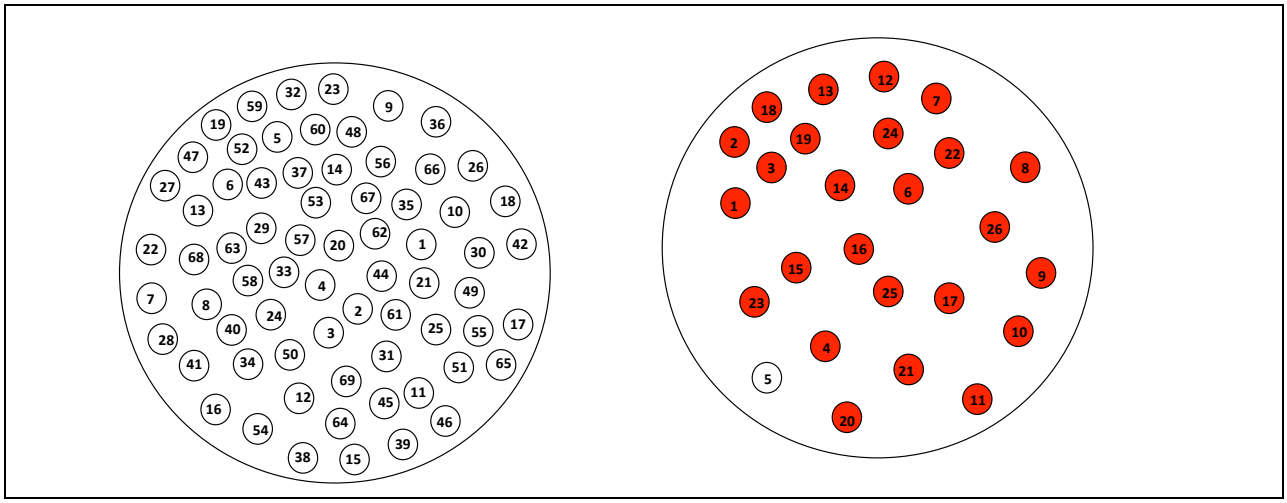
Probability of winning

The probability of winning the grand prize are extremely low. For example, the probability of winning the Powerball jackpot are one in 292,201,338. Powerball details how to play:

Powerball® costs $2 per play.

Select five numbers from 1 to 69 for the white balls; then select one number from 1 to 26 for the red Powerball.

Figure 1. Illustration of Powerball Number Selection.



To find the probability of winning the Powerball lottery, find the "number of winning lottery numbers" (or "n") and the "total number of possible lottery numbers" (or "k").

$$P = {}_nC_k = \frac{n!}{(n-k)!k!}$$

For example, the number of ways of picking 2 items from a set of 5 items is:

$${}_5C_2 = \frac{5!}{(5-2)!2!} = \frac{5!}{(5-2)!2!} = \frac{5*4*3*2*1}{(3*2*1)*2*1} = \frac{120}{12} = 10$$

Thus, with the set of five items {1,2,3,4,5} there are 10 combinations of groups of two items:

{1,2}, {1,3}, {1,4}, {1,5}, {2,3}, {2,4}, {2,5}, {3,4}, {3,5}, {4,5}.

This is the process followed to calculate the probability or odds of winning the lottery. In the Powerball, there are five numbers (white balls) chosen from a set of 69 numbers (order does not matter) and one red ball drawn.

First, find the probability of the five white balls drawn matching the five numbers on the lottery ticket:

$$ {}_nC_k = \frac{n!}{(n-k)!k!} = \frac{69!}{(69-5)!5!} = \frac{69!}{64!\,5!} = \frac{69*68*67*66*65}{5*4*3*2*1} = 11{,}238{,}513 $$

Then, there are twenty-six possible Powerballs (red balls):

$$ P = ({}_{69}C_5)(26) = 11{,}238{,}513*26 = 292{,}201{,}338 $$

There is a one in 292,201,338 chance of winning the Powerball.

So you're telling me there's a chance? – Llyod Christmas (Dumb and Dumber, 1994)

Much like the odds of a coin toss, which has a 50% probability of landing on heads each and every toss, the odds of winning the lottery are independent events. Participants cannot increase the probability of winning by playing more frequently, only by purchasing multiple tickets for the same drawing. There is a greater chance of being killed by a venomous spider than of winning the lottery. Here are some other odds to put the lottery odds in perspective (Ross, Westerfield and Jordan, 2017):

Odds of winning Mega Millions jackpot	1:135,145,920
Odds of being killed by a venomous spider	1:57,018,763
Odds of being killed by a dog bite	1:11,403,753
Odds of being killed by lightning	1:6,479,405
Odds of being killed by drowning	1:690,300
Odds of being killed in a car crash	1:6,209

Who plays?

There are two primary ways to view the lottery. First, the lottery can be viewed as a "painless tax that raises public funds without coercion" (Clotfelter & Cook, 1991, p. 9). Or, the lottery can be viewed "as a tax that falls disproportionately on the poor and uninformed" (Clotfelter & Cook, 1991, p. 10).

Forty-five states have lotteries. A little more than half of all Americans report playing the lottery (Isidore, 2018). Some survey results indicate that 10% of Americans purchase lottery tickets at least three times a week (Dixon, 2019). An average of $325 per year is spent on lottery tickets for each adult in the US (Isidore, 2017). However, a smaller group of participants account for a greater portion of lottery sales. For example, 20% of lottery players in Minnesota account for over 70% of sales, and similarly, 29% of lottery players in Pennsylvania accounted for 79% of sales (NASPL).

Moreover, a greater proportion of lower income citizens play the lottery. For this reason, the lottery is sometimes referred to as a regressive tax, like Robin Hood in reverse. Households with income less than $10,000 spend about 3% of income on the lottery (Clotfelter et al., 1999). Other survey results suggest that 28% of Americans who make less than $30,000 play the lottery

at least once a week compared to 18% of Americans who make more than $75,000 (Dixon, 2019). The bottom fifth of income earners spent more than twice as much on lottery tickets than the richest lottery players: $433 a year vs. $193 a year (Isidore, 2018). A large portion of income inequality may be attributable to state lotteries (Freund & Morris, 2005; Kearney, 2005).

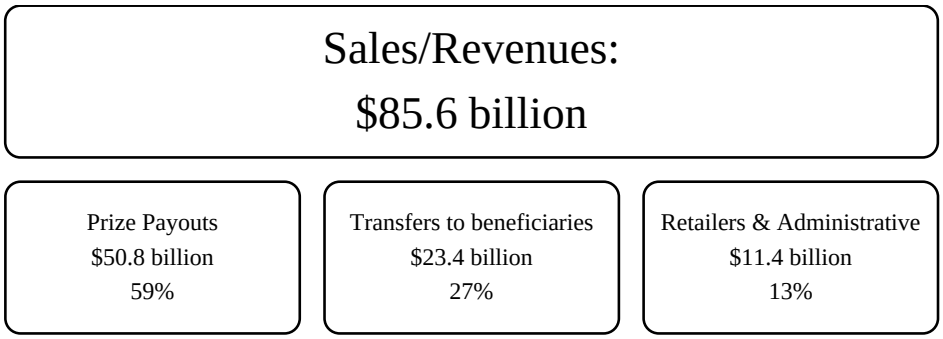
Monies and payouts

In 2018, Americans spent $85,561,870,343 on the lottery (NASPL). To put this in perspective, consider annual entertainment spending in 2014 (Thompson, 2015):

Lottery Tickets	70.5 billion
Sports/Books/Games/Movies/Music	63.0 billion
Sports Tickets	17.8 billion
Books	14.6 billion
Video Games	13.1 billion
Movie Box Office	10.7 billion
Music	6.8 billion

State lotteries have the lowest payout rate of any form of legal gambling (Clotfelter & Cook, 1989). On average, lotteries payout 63% of revenues in prizes and 27% to public beneficiaries (NASPL). For example, of 2018's $85.5 billion sales, $50.8 billion in prizes were paid to players and $23.4 billion was transferred to beneficiaries (NASPL). The range of total payouts varies by region, ranging from 15 percent to 73 percent in 2012.

Figure 2. State Lottery Revenues and Distributions in 2018.



For the Powerball, for example, lottery monies are distributed to states based on ticket sales (Grauschopf, 2018). Each state then decides how to use the funds. According to the North American Association of State and Provincial Lotteries, public beneficiaries include education, park services, veterans, and seniors. Wealthy individuals and regions tend to benefit disproportionally from money earmarked towards cultural programs and education, potentially exacerbating the regressivity of the revenue side of lotteries (Feehan & Forrest, 2007; Stranahan & Borg, 2004).

Lottery revenues that are not paid out in prize winnings or transferred to beneficiaries are used to pay retailers and cover administrative costs. Retail stores collect commissions on lottery

ticket sales. They also receive an award or bonus when a winning ticket is sold. Administrative costs include advertising, salaries, legal fees, and printing fees, among other costs.

MEGA MILLIONS

Mega Millions, a multi-state lottery, details how to play:

Mega Millions tickets cost $2.00 per play.

Players may pick six numbers from two separate pools of numbers – five different numbers from 1 to 70 (the white balls) and one number from 1 to 25 (the gold Mega Ball) – or select Easy Pick/Quick Pick. You win the jackpot by matching all six winning numbers in a drawing.

The jackpots start at $40 million and grow by a minimum of $5 million per draw each time the jackpot rolls.

Mega Millions drawing occur on Tuesday and Friday nights. To win, participants must correctly match all five numbers from the white balls (in any order) and correctly guess the number of the gold ball.

Much like the low probability of winning the Powerball, players have a low chance of winning the Mega Millions jackpot. You are more than twice as likely to get struck by lightning twice in your lifetime than to win the Mega Millions jackpot (Kahn Academy). Yet, large jackpots garner much attention. As the size of the winnings increase, so too do lottery sales (Kearney, 2005). As the jackpot increases, more high earners play making the game progressive instead of regressive (Oster, 2004). And as lottery sales increase, there is an increased chance of sharing the jackpot.

Payout options

There are two ways winners can receive the prize money. Winners may elect to receive one large cash payment immediately (“lump sum”), or winners may elect to receive scheduled payments over the course of thirty years (“annuity payments”).

For example, with a jackpot of $137 million, a winner would have the choice of a $89.8 million dollar cash payment (“lump sum”) or thirty average annual payments of $4.57 million (“annuity payments”). The annuity payment is reported as an average because the payments increase annually, typically by 5%. The total of the annuity payments, however, totals the $137 million jackpot. The lump sum payment is discounted, reflecting the present value of the future payments.

Taxes

Lottery winnings are considered ordinary taxable income and are therefore taxed the same as an individual’s wages or salary. Moreover, lottery winnings likely have a large impact on an individual’s tax bracket, i.e., a lottery winner will likely jump tax brackets upon winning. If a lump sum prize is chosen, the entire winnings are taxed in one year. If annuity payments are elected, annual payments are taxed each year.

Lottery winnings are taxed at the federal and state levels. Federal tax rates are based on the marginal tax brackets, which are always changing. For example, the highest individual federal tax bracket was 39.6%, 35%, and 37% in 2000, 2010, and 2018, respectively. After the federal government takes a portion of the winnings, most states tax lottery winnings as well. Rates vary by state, ranging from no state taxes in Washington and several other states to 8.82% in New York.

Continuing with the $137 million jackpot example, the full $89.8 million lump sum payout is first taxed at the federal tax rate and then the relevant state tax rate. Upon winning, a 25% federal tax is automatically with-held (Wattles, 2016). Then, the winner must pay the remaining federal tax liability. After federal taxes are remunerated, the state takes a share of the remaining winnings. If the $137 million jackpot was paid out as an annuity instead of a lump sum, the annuity payments would be subject to federal and state taxes every year. In this case, tax rates may vary and change substantially over the time period with changes in tax law.

BEHAVIORAL FACTORS AND CONSIDERATIONS

Behavioral influences

There are several behavioral factors that may influence an individual's lottery play, including, but not limited to:

- *Dreams:* Some people maintain that "[t]he pleasure you derive from the resulting daydreams is worth at least $2" (Ip, 2016). Another perspective is that "[o]ne of the central attractions of the game is that it evokes daydreams of desired buy unachievable status positions" (Beckert & Lutter, 2013). In this way, lotteries may be viewed as an entertainment expense instead of a speculative investment.
- *Relativity:* Humans are social creatures. Happiness depends, in part, on relative standing (Frank, 1985). Individuals who perceive their financial situation to be lower than their peers save significantly less than individuals who perceive their financial situation above their reference group (Schor, 1998). People are more willing to gamble when they have feelings of self-perceived social deprivation and also when surrounding peers gamble (Beckert & Lutter, 2013).
- *Prospect theory:* Kahneman and Tversky (1979) challenge traditional economic theory, emphasizing that individuals treat potential gains and losses differently: with a risky decision, individuals are apt to lock in gains (risk-averse) and take risks with losses (risk-seeking). Thus, people may be more likely to play the lottery when faced with a financial shock. People become risk-seeking to avoid realizing future losses. In addition, people are more willing to purchase lottery tickets if they are reminded of equality of chance (Haisley, Mostafa, & Loewenstein, 2008).
- *Weighting issues:* The second contribution of Kahneman and Tversky's (1979) Prospect Theory is weighting function. "[F]or both positive and negative prospects, people overweight low probabilities and underweight moderate and high probabilities." (Tversky & Kahneman, 1992, p. 312). Because the lottery is an extremely low probability event, people often overweight the probability of winning. In addition, lottery players often focus more on the size of the lottery prize and the frequency of drawings than on the probability of winning (Walker & Young, 2001; Cook & Clotfelter, 1991).

Heuristics

Heuristics are mental shortcuts or 'rules-of-thumb' used in judgment and decision making. Given the infinite choices people face on a daily basis, heuristics are essential for living in an uncertain world. However, under certain circumstances, heuristics can lead to faulty decision making. Applying heuristics inappropriately can lead to bias and negatively influence the decision making process. Belsky and Gilovich (1999, p. 13-14) explain:

> *Demonstrated decades ago by Kahneman and Tversky, representativeness is a rule of thumb that tells us that we can infer a lot of information about an object, a being, a pattern of behavior, or a set of results based on their similarities to other such objects, beings, patterns, or sets. Back in the day, our ancestors might have decided (in a hurry) between staying in a clearing to gather berries or running away based on the similarity between a newly encountered member of the cat family and the lions they knew to avoid. Today, representativeness might tell you to avoid investing with people who promise Bernard Madoff-like investment returns (a good result for most of us), but it might also tell you to avoid the stock market altogether (a less good result for most people).*

Below are several heuristics that may help explain why lotteries are so appealing (see also Griffiths & Wood, 2001).

- *Illusion of control:* Langer (1975) defines illusion of control as an expectancy of success higher than the objective probability should warrant. In the lottery, a chance setting, many individuals feel more in control due to factors such as involvement and choice of numbers (Langer & Ross, 1975). In an experiment, Langer (1975) found that people who picked their lottery numbers would sell their tickets for a higher price than people who had their lottery numbers chosen for them.
- *Representativeness heuristic*: The representativeness heuristic, proposed by Tversky and Kahneman (1971), refers to how people expect a representative relationship between a sample drawn from the population and the population itself. People often determine likelihood by similarity (i.e., like goes with like) and neglect base-rate probabilities or sample size considerations. This is related to the *gambler's fallacy*, or the expectation that the probability of winning will increase after a period of losses. For example, thinking that a jackpot is coming after a series of losing tickets is like thinking a heads is coming after a series of tails is tossed.
- *Availability heuristic*: The availability heuristic is the tendency to judge an event by the ease with which examples of the event can be retrieved from memory (Kahneman and Tversky, 1973). For example, people tend to think airplane crashes happen more frequently than they do because they are well publicized and car crashes happen less frequently than they do because they are not as well publicized. With lotteries, there is often a lot of publicity around winnings, yet the millions of losers do not get the publicity. Because the winning stories are so vivid, this gives the illusion that wins are more commonplace.
- *Sunk cost bias*: The sunk cost bias is a bias of ongoing commitment whereby people continue a behavior due to previously invested resources (time, money or effort)(Arkes & Blumer, 1985). By picking the same numbers for each drawing, participants may become entrapped, or committed to a goal that has not yet been achieved (Griffiths, 2012). Many

people choose the same numbers each week, thereby thinking the numbers are getting closer to winning.

- *Self-attribution bias*: The self-attribution bias is an individuals' tendency to attribute successes to personal skills and failures to factors beyond their control. Gamblers often "transform their losses into 'near wins' and spend far more time discussing their losses and discounting them while bolstering their wins." (Griffiths and Wood, 2001 citing Gilovich, 1983). Gamblers also often display the *hindsight bias*, also known as "knew-it-all-along" bias (Gilovich, 1983).

MONEY AND HAPPINESS

Money buys happiness, up to a point. Money alleviates poverty. Money allows basic needs to be met and some desires to be fulfilled. Here, money can have a profound effect on the quality of life. But the relationship between money and happiness is not straightforward. Oftentimes, we are not so good at judging what will make us happy. We think of money as a cure-all. But what really leads to happiness?

Income

As Portnoy (2018, p. 70) says in *The Geometry of Wealth*, "Money is more effective at diminishing sadness than increasing happiness." Consider these survey questions:

How happy are you on a scale of one to ten?

Now think about how much money you have in the bank, your salary. How much more money would you need to be a perfect 10?

When surveyed, individuals report needing "two to three times as much money" as they currently have to "be a perfect 10" (Leong, 2019, p. 5) No matter what the income or wealth level, people report that more money will lead to greater happiness. Happiness can be (1) experienced moment to moment throughout daily life, or (2) a reflection or evaluation of life. Beyond a certain level of income (around $75,000), experienced happiness does not increase with income.

Clason (1988) narrates in *The Richest Man in Babylon*, "[w]hat each person calls their "necessary expenses" will always grow to match your income unless you resist that urge. Do not confuse your necessary expenses with your desires." Desires often result in over-consumption. In fact, there is a link between high income and a "reduced ability to savour small pleasures" (Leong, 2019, p. 7). In their book *Your Money or Your Life*, Robin and Dominguez emphasize the point of 'enough,' whereby surpassing this point is, in the words of The Notorious B.I.G., *Mo' Money Mo' Problems*. Having too much 'stuff' overwhelms us. The voluntary simplicity movement shifts the focus from materialistic consumption to non-materialistic sources of satisfaction.

Goals

Results from a 2007 poll find that 81% of 18-to-25-year-olds say getting rich is their most or second most important life goal (Leong, 2019, p. 16). Tim Kasser researches materialistic values and goals, saying:

> *[W]hen people believe materialistic values are important, they report less happiness and more distress, have poorer interpersonal relationships, contribute less to the community, and engage in more ecologically damaging behaviors.*

Research finds a negative association between materialistic values and life satisfaction. Low self-esteem is associated with luxury purchases that is beyond one's means. Kasser (2016) summarizes that people who prioritize materialistic goals:

- Have worse money management skills (Donnelly et al. 2012, 2013)
- More gambling problems (Carver & McCarty 2013)
- Engage in behaviors that create more debt (Richins 2011, Watson 2003)

Individuals with intrinsic goals (e.g., self-acceptance, affiliation, community) are associated with higher levels of well-being while extrinsic goals (e.g., financial success, appearance, social recognition) are associated with lower levels of well-being (Kasser and Ryan, 1996).

What becomes of lottery winners?

Winning millions of dollars is not a one-way ticket to happiness. There are often news headlines highlighting the misfortunes of winners, such as "20 lottery winners who lost every penny" (Abadi, 2019). Is there truth to this, that a large portion of lottery winners receive a stream of bad luck, like the character Hurley on the television series *LOST*? Or is this the availability heuristic at work, covering headlining stories that are not representative of the bigger picture? The evidence is mixed. A study of 35,000 lottery winners found that 70% spent all their winnings and 1% filed for bankruptcy within five years (Hankins & Hoekstra, 2011; Haithcock, 2019). And interestingly, another found that neighbors of lottery winners are more likely to declare bankruptcy within a few years of the big win (Leong, 2019, p. 11). Yet, some studies indicate that more than 85% of U.S. lottery winners continue working (Arvey, Harpaz & Liao, 2004). And winners of substantial amounts tend to increase their savings rates (Imbens, Rubin & Sacerdote, 2001). However, a natural study of a randomized financial windfall finds that wealth is not passed on for generations, and that the descendants of the winners did not fare better than the descendants of the non-winners (Bleakley & Ferrie, 2016).

Hedonic psychology

> *Hedonic psychology...is the study of what makes experiences and life pleasant or unpleasant. It is concerned with feelings of pleasure and pain, of interest and boredom, of joy and sorrow, and of satisfaction and dissatisfaction. It is also concerned with the whole range of circumstances, from the biological to the societal, that occasion suffering and enjoyment.* – Kahneman, Diener and Schwarz (1999, p. 9)

The hedonic treadmill refers to the tendency to return to a relatively stable level of happiness. Even after significant life changes, both positive and negative, there is a tendency to return to a baseline level of happiness. Increases in income are associated with increases in expectations, and it is impossible to 'Keep up with the Jones'. Thus, the rich are no more happy

than the poor. A classic study finds that one-year after the event, lottery winners are no happier than paraplegics (Brickman, Coates, & Janoff-Bulman, 1978). People adapt to the situations.

Portnoy (2018, p. 77) summarizes how smaller, frequent purchases can better cope with the hedonic treadmill:

> *Take these two experiments. In one, subjects were each awarded a $50 prize, but some won two $25 lotteries, while others won just one for the full amount. In another, a group of subjects each received a three minute massage session. One group received two 80-second massages with a 20-second break. The other group received a full three-minute massage. In both experiments, people reported achieving more pleasure from the first instance with the shorter recurring experiences rather than the longer single experience. Therefore, frequent manicures, the occasional weekend getaway, and a fixed "date night" with your partner, add up to more than that one elaborate vacation you've been dreaming about for years...*

What makes us happy?

In *Happy Money: The Science of Happier Spending*, Elizabeth Dunn and Michael Norton make five recommendations for better aligning money management with happiness:

1. *Buy Experiences*: Experiential purchases provide more happiness than material purchases. Instead of purchasing furniture or a car, take a trip. The lasting memories will provide enduring happiness.
2. *Make It a Treat*: We appreciate something more when it is novel or special. Thus, cutting back on your favorite indulgence (e.g., lattes, chocolate, wine) will increase its appeal and your appreciation. Savor the small things.
3. *Buy Time*: Shifting the focus from money to time leads to choices that better reflect passions and interests. Outsource chores or projects that are dreaded and take time away from other activities that bring joy.
4. *Pay Now, Consume Later*: Many people use credit to buy now and pay later. But if we pay now and consume later, we can bask in the pleasure of expectation and anticipation.
5. *Invest in Others*: Spending money on others leads to a greater increase in happiness than spending on ourselves.

JACKPOT!

Your decision

Congratulations! Despite the low odds, you won the *Mega Millions* $80 million jackpot. (See Appendix 1 for the details.) So, now what? Do you take the lump sum or the annuity payments? To make an informed decision, consider time value of money calculations, taxes, behavioral influences, life goals and happiness.

Appendix 1. Payout options for the $80,000,000 jackpot

	Gross Payments	
Year	**Annuity**	**Lump Sum**
1	1,204,115	57,300,000
2	1,264,321	
3	1,327,537	
4	1,393,913	
5	1,463,609	
6	1,536,790	
7	1,613,629	
8	1,694,310	
9	1,779,026	
10	1,867,977	
11	1,961,376	
12	2,059,445	
13	2,162,417	
14	2,270,538	
15	2,384,065	
16	2,503,268	
17	2,628,432	
18	2,759,853	
19	2,897,846	
20	3,042,738	
21	3,194,875	
22	3,354,619	
23	3,522,350	
24	3,698,467	
25	3,883,391	
26	4,077,560	
27	4,281,438	
28	4,495,510	
29	4,720,286	
30	4,956,300	
	80,000,000	**57,300,000**

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J&J FARMS: CAPITAL BUDGETING ANALYSIS USING PREDICTIVE ANALYTICS & DATA VISUALIZATIONS

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INTRODUCTION

Sam Watson, the national sales manager for Disruptive Farming Technologies, met Jake Johnson in high school, where they played football together as members of the Bulldogs football team. Sam called Jake and asked to meet at Second Street Café in Ottumwa on one of his sales trips through the Iowa farming community. As Sam and Jake were talking over a cup of coffee and breakfast, Jake shared with Sam the increasing difficulty he was having in finding seasonal workers during planting and harvesting seasons. Sam presented Jake with a possible alternative, the DT1150 autonomous planter/harvester.

Jake was intrigued by the new technology but blanched when Sam told him the price tag. Sam said, "These new machines are state of the art Jake, and while the price is a little steep at $1,000,000 each, I think that an honest analysis of the benefits versus the cost will reveal that this would be a good move for you." Jake replied, "You know Sam, I've been wondering how I'm going to continue to operate my farm in the coming years. Finding folks to work the planting and harvest is becoming harder and harder. Maybe this is the way to go. I'll give it an honest assessment." With that they went on talking about the "glory" days of Bulldog football and their rivalry with the Central Decatur Cardinals. Sam asked Jake, "How is Lydia? You know Jake, you really got lucky to marry her. You were definitely swinging out of your league there!" Sam and Jake both met and married their high school sweethearts at Ottumwa High. Jake replied, "Don't I know it! How is Carol? She was always one of the nicest people to be around when we were in high school." Their conversation continued with small talk and when they had finished their breakfast, they parted company and Jake told Sam that he would give the new technology serious consideration.

The next day after Jake and Sam met you received a phone call from Jake, and he asked you to help him analyze this prospective equipment acquisition. You told Jake that you would take the assignment, and during the conversation, you asked Jake several questions to learn about his current operation, and the potential new paradigm. The information that you gleaned from that conversation is summarized below.

CURRENT FARMING OPERATION

Jake owns and operates a 5,000-acre farm near Ottumwa, Iowa where he grows corn and soybeans. Because of the growing season in Iowa, which usually runs from early April to mid-October or about 200 days, Jake grows one corn crop and two soybean crops per year. Jake inherited the farmland which has been in his family for 4 generations from his father. He currently operates the farm in a traditional manner, employing 2 full time farmhands and numerous seasonal workers during planting and harvesting. The growing season and Jake's current operation allows for 25 days to plant and 30 days to harvest his crops. In recent years Jake has noticed that his ability to hire seasonal workers is becoming increasingly difficult and more costly.

The per bushel average price for Jake's crops is presented in Table 1 below. The variable cost and historical yield of the two crops is presented in Tables 2 and 3 below. Machine overhead cost represents the cost per bushel to plant and harvest the crops. This includes fuel, maintenance, oil, etc. Seed/Chemical cost is the cost per bushel for seed, pesticides/herbicides, fertilizer, and interest charged by Jake's supplier, Barnwell Seed and Feed. Labor cost is the per bushel cost of labor (permanent and seasonal) to plant and harvest the corn and bean crops. Jake believes that the price of corn and soybeans as well as the machinery, seed/chemical, and labor costs will continue to follow the trend that is indicated in the data presented in Tables 1 – 3. He also believes that the current and developing science of traditional farming will cause the per acre yields to continue to follow the trends indicated in Tables 2 & 3.

Table 1: Historical Average Crop Prices per Bushel

Year	Corn Price	Soybean Price
2001	$1.89	$4.43
2002	$2.13	$4.93
2003	$2.27	$6.08
2004	$2.47	$7.56
2005	$1.96	$5.95
2006	$2.28	$5.65
2007	$3.39	$7.74
2008	$4.78	$11.31
2009	$3.75	$10.05
2010	$3.83	$9.97
2011	$6.02	$12.53
2012	$6.67	$13.96
2013	$6.15	$14.07
2014	$4.11	$12.47
2015	$3.71	$9.49
2016	$3.48	$9.39
2017	$3.36	$9.39
2018	$3.47	$9.15
2019	$3.75	$8.43
2020	$3.50	$8.98

Table 2: Corn Operations per Bushel (1 crop per year)

Year	Machine Overhead	Seed/Chemical Cost	Labor Cost	Yield per Acre	Average Price/Bushel
2011	$0.80	$1.83	$0.17	180	$6.02
2012	$0.80	$1.80	$0.18	180	$6.67
2013	$0.85	$1.66	$0.19	180	$6.15
2014	$0.79	$1.73	$0.19	180	$4.11
2015	$0.70	$1.62	$0.19	180	$3.71
2016	$0.65	$1.40	$0.18	180	$3.48
2017	$0.72	$1.34	$0.20	180	$3.36
2018	$0.67	$1.41	$0.18	198	$3.47
2019	$0.63	$1.30	$0.19	199	$3.75
2020	$0.62	$1.38	$0.19	201	$3.50

Table 3: Soybean Operations per Bushel (2 crops per year)

Year	Machine Overhead	Seed/Chemical Cost	Labor Cost	Yield per Acre	Average Price/Bushel
2011	$1.61	$3.62	$0.53	50	$12.53
2012	$1.61	$3.27	$0.55	50	$13.96
2013	$1.69	$3.11	$0.59	50	$14.07
2014	$1.58	$3.33	$0.59	50	$12.47
2015	$1.51	$3.25	$0.59	50	$9.49
2016	$1.35	$3.14	$0.57	50	$9.39
2017	$1.37	$3.09	$0.62	50	$9.39
2018	$1.22	$3.28	$0.56	56	$9.15
2019	$1.22	$3.01	$0.58	56	$8.43
2020	$1.14	$3.24	$0.60	56	$8.98

If Jake did not farm his land, he could rent the land to other farmers for a price of $600 per acre per year, but he enjoys the farming life and chooses to continue to work the land himself.

The equipment that he employs, along with purchase price data, is presented in Table 4. All the equipment is being fully depreciated over its life expectancy using a straight-line depreciation method.

Table 4: Equipment Currently Used on J&J Farm

Equipment	Purchase Cost (New)	Quantity	Life Expectancy (Years)	Age (Years)
Tractor 185 HP	$110,000.00	1	15	5
Tractor 135 HP	$75,000.00	1	15	5
Utility Tractor 65HP	$35,000.00	1	15	5
Combine Harvester	$250,000.00	1	15	5
Pick Up Truck	$40,000.00	4	10	10
Disc Plow	$18,000.00	1	10	15
Chisel Plow	$15,000.00	1	10	15
Field Cultivator	$12,000.00	1	10	15
Grain Drill	$50,000.00	1	10	15
Planter (corn/bean)	$70,000.00	1	10	15
Combine Harvester Corn Head	$42,000.00	1	15	5
Combine Harvester Grain Head	$35,000.00	1	15	5
Sprayer-boom type	$45,000.00	1	10	15
Mower	$5,000.00	1	10	15
Transportation/Storage Equipment				
Grain Wagon	$12,000.00	20	10	15
Grain Truck	$25,000.00	5	10	15
Buildings				
Pole Barn Equipment Shed	$25,000.00	2	30	20

If Jake were to choose to purchase the new robotic system, he would sell most of his current equipment to other farmers in the area. Jake has decided that if he adopts the new farm system, he will continue to operate his Utility Tractor for general mowing and light hauling activities. He will also keep the Pickup Trucks, the Mower Deck, and the equipment storage building. The Pole Barn would, however, require significant renovations and upgrades to accommodate the new equipment and related charging stations. These renovations are estimated to cost $200,000 per structure.

During planting and harvesting seasons, Jake operates, on average, a 16-hour per day schedule, and usually completes planting operations in 25 days (10 days to plant the corn crop, and 7.5 days each to plant 2 soybean crops). The harvesting operations generally require 30 days operating the Combine Harvester (10 days each for one corn crop and 10 days each for two soybean crops). To estimate how much to expect in salvage value from the sale of his existing machinery, you use the information presented in Tables 5a and 5b from the Iowa State University Extension Service (May 2015) for the analysis.

Table 5a: Remaining Salvage Value as Percent of New List Price

	30-79 hp Tractor			80-149 hp Tractor			150+ hp Tractor			Combine, Forage Harvester		
Annual Hours	**200**	**400**	**600**	**200**	**400**	**600**	**200**	**400**	**600**	**100**	**300**	**500**
Age												
1	65%	60%	56%	69%	68%	68%	69%	67%	66%	79%	69%	63%
2	59%	54%	50%	62%	62%	61%	61%	59%	58%	67%	58%	52%
3	54%	49%	46%	57%	57%	56%	55%	54%	52%	59%	50%	45%
4	51%	46%	43%	53%	53%	52%	51%	49%	48%	52%	44%	39%
5	48%	43%	40%	50%	49%	49%	47%	45%	44%	47%	39%	34%
6	45%	40%	37%	47%	46%	46%	43%	42%	41%	42%	35%	30%
7	42%	38%	35%	44%	44%	43%	40%	39%	38%	38%	31%	27%
8	40%	36%	33%	42%	41%	41%	38%	36%	35%	35%	28%	24%
9	38%	34%	31%	40%	39%	39%	35%	34%	33%	31%	25%	21%
10	36%	32%	30%	38%	37%	37%	33%	32%	31%	28%	23%	19%
11	35%	31%	28%	36%	35%	35%	31%	30%	29%	26%	20%	17%
12	33%	29%	27%	34%	34%	33%	29%	28%	27%	23%	18%	15%
13	32%	28%	25%	33%	32%	32%	27%	26%	25%	21%	16%	13%
14	30%	27%	24%	31%	31%	30%	25%	24%	24%	19%	14%	12%
15	29%	25%	23%	30%	29%	29%	24%	23%	22%	17%	13%	10%
16	28%	24%	22%	28%	28%	27%	22%	21%	21%	16%	11%	9%
17	26%	23%	21%	27%	27%	26%	21%	20%	19%	14%	10%	8%
18	25%	22%	20%	26%	25%	25%	20%	19%	18%	13%	9%	7%
19	24%	21%	19%	25%	24%	24%	19%	18%	17%	11%	8%	6%
20	23%	20%	18%	24%	23%	23%	17%	17%	16%	10%	7%	5%

Table 5b: Remaining Salvage Value as Percent of New List Price

Machine Age	Plows	Other Tillage	Planter, Drill, Sprayer	Mower, Chopper	Baler	Swather, Rake	Vehicle	Other
	Plows	Cultivator	Planter, Drill, Sprayer	Mower, Chopper	Baler	Swather, Rake	Vehicle	Other
1	47%	61%	65%	47%	56%	49%	42%	69%
2	44%	54%	60%	44%	50%	44%	39%	62%
3	42%	49%	56%	41%	46%	40%	36%	56%
4	40%	45%	53%	39%	42%	37%	34%	52%
5	39%	42%	50%	37%	39%	35%	33%	48%
6	38%	39%	48%	35%	37%	32%	31%	45%
7	36%	36%	46%	33%	34%	30%	30%	42%
8	35%	34%	44%	32%	32%	28%	29%	40%
9	34%	31%	42%	31%	30%	27%	27%	37%
10	33%	30%	40%	30%	28%	25%	26%	35%
11	32%	28%	39%	28%	27%	24%	25%	33%
12	32%	26%	38%	27%	25%	23%	24%	31%
13	31%	24%	36%	26%	24%	21%	24%	29%
14	30%	23%	35%	26%	22%	20%	23%	28%
15	29%	22%	34%	25%	21%	19%	22%	26%
16	29%	20%	33%	24%	20%	18%	21%	25%
17	28%	19%	32%	23%	19%	17%	20%	24%
18	27%	18%	30%	22%	18%	16%	20%	22%
19	27%	17%	29%	22%	17%	16%	19%	21%
20	26%	16%	29%	21%	16%	15%	19%	20%

PROPOSED OPERATIONS

The engineers from the company selling the machines, Disruptive Farming Technologies, have provided Jake with literature and information that is described below.

The DT1150 is a fully automated robotic machine that, once configured for either planting or harvesting, can be deployed into the field and requires only onboard monitoring and periodic reloading during the planting phase and periodic unburdening during the harvesting phase. The system is controlled by an onboard processor and GPS receiver that will manage its location in the field to within one meter. This precise control and consistent operation provide for an improved yield of at least 5% per acre. This new system will also reduce the per bushel labor cost by about 60%.

Each of the robotic systems has a price tag of $1,000,000 and includes all the necessary implements, computers, GPS, etc. to function. These are solar electric machine, so diesel cost will drop significantly, however, because of the novelty and other aspects associated with any disruptive technology, it is expected that machinery overhead cost will increase. You estimate that over the 10-year horizon on which this project is being evaluated overall machinery overhead cost

will increase by approximately 15%. Per bushel seed and chemical cost should remain relatively unchanged.

Because of the computer brain in the system, each DT1150 can operate at an average speed of 5.5 mph which includes time needed for turning and reversing direction at the end of a row. The machine has a 24-foot span for planting and harvesting. The time constraints that Jake has for planting and harvesting, dictates that his machinery must be able to plant all 5,000 acres in as little as 7 days for one soybean crop. You determine that Jake would need to purchase 3 units to be able to completely prepare, cultivate, seed, and fertilize his entire farm on schedule. Purchasing 3 units would provide a small margin in planting and a good margin in harvesting because there are more days to harvest. This margin is appealing, however, because harvesting is a delicate operation that is highly subject to the whims of the weather.

Jake has reached out to you to conduct an independent analysis of this project and to make a recommendation as to whether, financially, this makes sense. Jake has also shared with you that because of farming subsidies and such he has historically paid an average federal plus state tax rate of 20% combined. Finally, when you asked Jake about the cost of capital, he suggested that if he sold all his equipment and invested the money, he would expect to earn a rate of return of around 10%.

Your job as his financial analyst is to run all calculations based on three potential options: Option 1, maintain current operations; Option 2, purchase the equipment; Option 3, rent the property and sell all current fixed assets.

Use the Excel template provided to structure your analysis and answer the following questions:

1. Use the =FORECAST.ETS function in Excel to estimate future prices, quantities, and costs per bushel (seeds/chemicals, labor and overhead) for the years 2021 through 2031. For the quantities in units, use the =INT function in addition to the =FORECAST.ETS function to round to nearest whole number. Create line charts for each commodity's price, volume and costs (combine all costs on one chart and include the total); 3 charts for each commodity. Interpret the trends and the impact on future profitability.

2. Create a historic depreciation schedule for all current fixed assets. Calculate the projected gain or loss on disposal of applicable assets and include the impact of income taxes (use 400 hours for related assets). Use the =SLN function to calculate annual depreciation for each asset. Use the =SUMIF function to find the depreciation amounts for both the manual and automated operations for the remaining ten-year period. Use side-by-side column charts to graph total asset cost before and after and total depreciation expense before and after deploying the new DT1150 system. Label all axis and include a chart title. Include data values on each column. Interpret the impact of the changes in fixed assets on profitability and cash flows. Then calculate the net proceeds from disposal of all fixed assets and the income tax implications if the property is leased to a third party and all assets are disposed.

3. Option 1: Calculate the annual operating cash flows for the ten-year period 2021-2032 based on the manual operation projections using the price and cost estimates. Use the =HLOOKUP function to retrieve values from the trends tab and cell referencing for values on the depreciation tab. Calculate the net present value of the cash flows. Option 2: Repeat the calculation of cash flows for the ten-year period, based on the new automated operation projections using the price and cost

estimates and other projections. Calculate the net present value of the cash flows. Compare Option 1 to Option 2: Calculate the net present value of the incremental cash flows from deploying the new DT 1150 system. Option 3: Calculate the net present value of leasing the acreage to a third party and disposing of all fixed assets except the pole barn.

4. Compute the standard capital budgeting metrics for the DT1150 project. Use =NPV, =IRR and =MIRR functions in Excel. Calculate Payback, NPV, IRR, MIRR (use incremental cash flows)

5. Recommend whether Jake should continue to operate as he is currently operating (option 1), adopt the new system (option 2), or lease the acreage and liquidate his assets (option 3).

6. What additional information would you acquire and what further analysis would you recommend to Jake to help in making his decision? Create a report and prepare a recorded presentation to share your findings and recommendations.

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VACATION OWNERSHIP: A CASE STUDY IN TIMESHARE DECISION-MAKING

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CASE SYNOPSIS

This case asks students, acting in the role of Michael and Leah Jenkins, to evaluate two timeshare purchase opportunities in the mountains of Colorado. One is a new unit in a recently completed resort complex. The other is a five-year-old comparable unit available through eBay at a much lower price. Both timeshares involve an annual maintenance fee and an exchange program fee but would save the Jenkins hotel and incremental meal costs for their annual ski trip to Colorado. Additionally, the Jenkins are considering renting an unsold unit in the same resort complex as well as renting a private residence through Airbnb, Inc. Students should use net present value (NPV) analysis to evaluate the four options.

INTRODUCTION

From its beginnings in Europe in the mid-1960s the timesharing business has grown to be an important sector within the "hospitality" industry.[1] In its simplest form a "timeshare" or "vacation ownership" refers to a contractual arrangement whereby an individual purchases a property, typically a condominium unit or suite in a resort hotel, for use during a defined time interval, say, the first week in November, for a specified number of *years or in perpetuity*.[2] Along with the timeshare purchase the individual typically agrees to pay an annual management fee to the owner of the condominium or resort complex to cover the timeshare unit's pro rata share of expenses associated with the complex, including amenities, maintenance and repairs, salaries of employees, security, insurance, and taxes. Alternative arrangements may give the timeshare owner merely the right to use the property (without ownership) for a fixed number of

[1] "Hospitality" is just one of several terms used to refer to the industry encompassing the timesharing business. Other commonly used industry terms are "resort," "lodging," "leisure," "tourism," and "travel." For purposes of this case we stick with the term "hospitality."

[2] Panela et al. (2019) points out that there are numerous terms used in lieu of "timeshare," including "interval ownership," "fractional ownership," "vacation interval," "interval resort sharing," "shared ownership," and "multiple ownership property." Currently, the timeshare sector within the hospitality industry is commonly known as "vacation ownership."

years and/or the right to substitute other time intervals or even other timeshare locations through an exchange program.[3]

One issue related to the vacation ownership contract that has drawn considerable attention is whether a timeshare can be considered an investment product as well as a consumer product. While Hovey (2002) makes a case for viewing a timeshare as an investment product, other analysts have generally focused on timeshares as a consumer product and rejected the idea of a timeshare as an investment; see, for example, Ziobrowski and Ziobrowski (1997) and Powanga and Powanga (2008). Their argument, in part, is that the high marketing costs embedded in the purchase price of a timeshare interval result in significant depreciation of the property soon after purchase, leaving little or no resale value.[4] Thus, there is minimal opportunity for investment return from a timeshare. This is particularly true in view of the significant risks associated with timeshare ownership.[5] Survey results of timeshare owners by Crotts and Ragatz (2002) confirm that most timeshare owners view timeshare intervals as strictly a consumer product rather than an investment.[6]

Given the significant place of vacation ownership in the hospitality industry and the emphasis on timeshares as a consumer product, it seems appropriate to introduce students majoring in finance, real estate, and/or financial planning to the analytics of purchasing a timeshare interval, whether for themselves or for a client. We do so in this paper using a case study in timeshare decision-making based on net present value (NPV) analysis.

CASE SCENARIO

Michael Jenkins and his wife Leah love to snow ski. Michael, a commercial real estate lender with a regional banking organization, and Leah, a pharmaceutical sales representative, live in central Tennessee with their two young children, but they usually spend a week of their annual vacation time skiing in Colorado during early February. Michael grew up in upstate New York and learned to snow ski at an early age. Leah water skied as a teenager living in Missouri but quickly transitioned to snow skiing after marrying Michael. They hope to start taking their children with them when they are old enough to take ski lessons and then anticipate continuing their ski vacations until their children are grown in 15 years or so.

The only drawback to their vacation passion is the cost. Last year they purchased their own skis and apparel, and grandparents in southern Kentucky readily volunteer to baby-sit their children. But a week for two at a Colorado resort hotel during the peak ski season typically costs

[3]Numerous researchers have explored the history of timesharing, including legal and technical issues associated with interval timeshares. See, for example, Gray (1974), Terry (1994), Woods (2001), Hovey (2002), Upchurch and Gruber (2002), Pryce (2002), Nabawanuka and Lee (2009), Gregory and Weinland (2016), and Panela et al. (2019).

[4] Upchurch and Gruber (2002) state that sales and marketing costs typically account for 40-60 percent of the timeshare purchase price. Other analysts agree, asserting sales and marketing costs in the neighborhood of 50 percent of the timeshare price; see, for example, Tharmalingam (1986) and Powanga and Powanga (2008).

[5] For a discussion of the risks of timeshare ownership, see Hovey (2002) and Larson and Larson (2009).

[6] For a discussion of consumer value that timeshare owners perceive from their timeshares, see Sparks et al. (2007), Sparks et al. (2008), and Bradley and Sparks (2011). An important detractor from consumer value, as reported by Sparks et al. (2007) is consumers' dissatisfaction from not being able to generate any return on their investment owing to poor resale options.

around $4,200 for air travel ($1,400) and hotel lodging ($2,800), plus $400 in added meal costs over the Jenkins' weekly meal budget at home. Moreover, with the growing popularity of snow skiing, resort hotel prices have increased significantly in recent years, even exceeding the general inflation rate. Thus, while both Michael and Leah make "good money" in their respective jobs, they also like to take other trips during the year and so cannot afford to devote their entire vacation budget to their one-week ski trip to Colorado.

Looking for ways to trim their vacation expenses, the Jenkins have been exploring timeshare opportunities. By acquiring a one-week timeshare in a Colorado resort complex, they believe they can essentially lock-in the price of future lodging (except for required management fees) at its present level, thereby avoiding the rising cost of rental accommodations. And by preparing most of their meals in their timeshare unit's kitchen, they can effectively eliminate their $400 incremental meal costs plus an additional $60 starting in Year 3 when the Jenkins start taking their children with them on their trip. In addition, they have heard of exchange programs that would allow them occasionally to trade their vacation week in Colorado for another timeshare week, either at another ski resort, say, in Vermont, or at a beach resort in Florida.

Finally, while the Jenkins do not think of a timeshare as an investment, they are still hopeful that they can sell the unit for a reasonable sum when they lose interest in family skiing. But they are not naïve and are aware, as Stingham (2010) notes, that there is no organized market for used timeshares, making resale challenging, to say the least.[7] Thus, while some resort condominiums do try to help interval owners sell their timeshares, most operators leave resales to realtors or to the interval owners themselves (Woods, 2001). However, the development of eBay has essentially opened a secondary timeshare market of sorts. Additionally, the Jenkins have seen television, magazine, and billboard ads by companies that specialize in helping owners sell or otherwise dispose of their timeshare units; see, for example, Wesley Financial Group, LLC (2019). But a review of timeshares for sale on eBay indicates a glut of used timeshares available at heavily discounted resale prices. Moreover, the absence of any established secondary market opens the opportunity for scam artists to enter the vacuum (Shadel, 2017), further complicating opportunities for resale.

THE ANALYTICS OF TIMESHARE OWNERSHIP

Having studied the vacation ownership opportunities in the mountains of Colorado, the Jenkins have identified two properties for consideration. One is a new, two-bedroom timeshare unit in a recently completed resort complex which lists for $32,500 for a week in late February, plus a management fee of $250 for the first year to cover the pro rata share of maintenance costs, taxes, and other expenses. Additionally, membership in an exchange program is estimated to cost $175 annually.[8] Alternatively, the Jenkins have explored the available timeshare offerings on eBay and have located a five-year-old comparable timeshare unit in the same mountain area

[7] For discussions of the difficulties and risks that timeshare owners face in trying to resell their timeshare, see Gutner (1993) and Shadel (2017).

[8] In fact, the membership fee is only $100 a year, but with additional fees for using the exchange program the Jenkins estimate that the exchange membership will cost about $175 annually.

for only $650 with a current management fee of $280 plus $175 for an exchange program.[9] Still other options the Jenkins might consider are an unsold, two-bedroom unit in the same resort complex, which rents for $2,100 per week, and weekly rental of a private residence through Airbnb, Inc., which is priced at $600 per week.[10]

In analyzing alternative lodging arrangements, the Jenkins must address three issues, namely, 1) how many years they anticipate spending an annual winter vacation week in Colorado, 2) what expected inflation rate(s) to assign to hotel lodging and incremental meal costs as well as to timeshare management fees and the cost of an exchange program, and 3) at what price they expect to sell their timeshare when they no longer desire to use their Colorado vacation ownership. Additionally, because both Michael and Leah took courses in finance while in college, they know to discount the expected cash flows associated with the timeshare at an appropriate, risk-adjusted discount rate. Risks associated with timeshare ownership are numerous not only at the time of purchase but also during ownership and at the point of disposition, as discussed in Hovey (2002) and Larson and Larson (2009).

Still another issue that the Jenkins must deal with is how to finance the purchase—whether through a cash purchase or a loan offered by the resort owner/developer. As noted in Ziobrowski and Ziobrowski (1997) and Powanga and Powanga (2008), mortgage financing by financial institutions is typically unavailable but may be offered to buyers of new timeshares by the resort owner/developer. Interestingly, however, survey evidence regarding individuals' motivation for purchasing a timeshare highlights several key factors, including quality of accommodation, exchange opportunities, financial savings, resort features, and credibility of the developing company, but not the method of financing (Crotts and Ragatz, 2002; Cortes-Jimenez et al., 2011). This is particularly significant since finance theory, per Fisher's Separation Theorem, isolates the financing decision from the purchasing/investing decision.[11] Thus, for Michael and Leah the decision to purchase a time share should be made on its own merits. Then if they decide to purchase, they can wrestle with the financing decision.[12]

In its simplest form a vacation ownership can be analyzed using an NPV model to determine if 1) the lodging and incremental meal cost savings expected from the timeshare purchase, coupled with 2) the resale price at the end of its expected useful life, outweigh the costs associated with the timeshare. Principal costs of ownership are 1) the initial outlay for the timeshare plus 2) the projected management fees over the life of the timeshare, and 3) the cost of membership in an exchange program. Recognizing these benefits and costs of timeshare ownership, the Jenkins must consider the following information from their research:

1. Air fare ($1,400) and hotel accommodations ($2,800) are estimated to total $4,200 for two people for one week in Colorado during ski season. Alternatively, weekly rental of an

[9] Because 1) there is no established secondary market in timeshare units and 2) buyers of used timeshares must pick up the annual management fee, it is not unusual for existing units to be listed at highly discounted prices, even as low as $1.00.

[10] Still another option akin to Airbnb is Vacation Rental by Owner (VRBO), which, as the name implies, facilitates vacation rentals of private residences.

[11] For a discussion of Fisher's Separation Theorem as applied to finance, see Ng (2001).

[12] In the only published case study (of which the current authors are aware) on timeshare decision-making, Cook and Wolverton (2003) provide a series of questions for analysis in the Teaching Note. But the focus of the questions is on the various financing options available to the potential buyers. Even the NPV analysis presented deals primarily with the financing issue.

unsold two-bedroom condominium in a resort complex costs $2,100, and rental of a private residence through Airbnb, Inc. for the same week costs $600.

2. Estimated incremental meals costs (in excess of the couple's home weekly meal budget) are estimated at $400 but should increase by approximately $60 in three years when the Jenkins plan to start taking their children.

3. The price of a new, two-bedroom timeshare unit in a recently completed resort complex for one week (7 nights) in late February is $32,500 plus the initial annual management fee of $250, less the initial incremental meal costs of $400. Additionally, an optional membership in an exchange program sells for an annual fee of $175. Alternatively, the Jenkins have identified a comparable five-year-old unit in the same mountain area offered on eBay for only $650, plus a current management fee of $280 and an annual exchange program fee of $175.

4. With kitchen facilities available in both new and used timeshare units, as well as in both rental options, savings in incremental meal costs should be the same in all arrangements.

5. The expected inflation rate for lodging and restaurant (incremental meal) costs over the life of the timeshare is 4.0% per year. By contrast, the anticipated inflation rate for the timeshare management fee is 3.5% for the first 10 years of the timeshare's life; thereafter, the management fee is expected to increase at a 6.0% annual rate owing to added maintenance expenses. Finally, the price of the exchange program is expected to increase at 4.0% annually.

6. The expected useful life of the timeshare is 15 years (until the Jenkins' children are grown), at which point the Jenkins anticipate adopting vacation interests other than snow skiing and selling any timeshare property that they own.

7. The sales price of a new timeshare at the end of its useful life is anticipated to be 5% of the purchase price. By contrast, the sales price of a used timeshare purchased through eBay is expected to be the same as the purchase price since the purchase price was already heavily discounted.

8. The discount rate for NPV analysis depends on the perceived riskiness of the timeshare purchase. Alternative discount rates suggested are 5% (low risk), 8% (medium risk), and 12% (high risk).

CASE ANALYSIS REQUIREMENTS

With the above information, you (as the Jenkins couple) are to create an Excel spreadsheet to calculate the NPV of both the new timeshare unit and the five-year-old unit available through eBay as well as the two available rental options, all using a time horizon of 15 years. In so doing, you will consider the following scenarios from the information presented above to determine which scenario(s), if any, is viable, that is, generates a positive NPV. You should choose which discount rate to use—low risk, medium risk, or high risk—and explain your choice of risk level.

1. Scenario 1—New Timeshare at Purchase Price of $32,500, Plus the Management Fee and Exchange Program
2. Scenario 2—Five-Year-Old Timeshare Unit at Purchase Price of $650, Plus the Management Fee and Exchange Program.
3. Scenario 3—Unsold Timeshare Unit at Rental Price of $2,100 Per Week, With No Management Fee or Exchange Program

4. Scenario 4—Airbnb Residence at Rental Price of $600 Per Week, With No Management Fee or Exchange Program

Finally, based on your analysis, which vacation arrangement would you choose, and why?

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MARRIOTT INTERNATIONAL, INCORPORATED: CAPITAL STRUCTURE & FINANCING DECISIONS AMID THE COVID-19 CRISIS IN SPRING 2020

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INTRODUCTION

It is mid-April 2020, and the world has been hit with a pandemic. Stephanie Jones[1] is sitting in her office after her meeting with Kathleen K. Oberg, Executive Vice President and CFO of Marriott International. Stephanie has worked as senior financial analyst on the CFO team for the past 3 years. Today she has been asked to create a new pro-forma financial statement for 2020 and 2021, and to estimate additional financing needed during these tumultuous times.

This is no easy task, and Stephanie knows that no matter what her forecasts will probably be off as for the foreseeable future the environment keeps changing as the economy, hotel industry and Marriott have never experienced anything like this before. Despite that, Stephanie knows that these forecasts can be helpful in decision-making during the uncertain times, and help management identify the key factors they need to pay attention to. Identifying the financing needs will also help in ensuring the relationship with creditors is good and Marriott can plan ahead and work as a team with their creditors.

Stephanie has no time to waste. She will start by reviewing past financial statements. She will review what information American Hotel & Lodging Association has provided about the recent industry standing and outlook during the pandemic. She knows it is important to look at multiple scenarios for the forecasts, and to identify the key factors affecting the financing needs. After her comprehensive analysis she will have to write a memo to the CFO with her findings and recommendations.

COVID-19 AND THE HOTEL INDUSTRY

Regardless of the speed of recovery, 2020 will go down as the worst year for the global hotel industry. Many properties are already closed or closing. All hotel companies, big and small, are facing severe financial stress. Layoffs are happening in the hundreds of thousands in the U.S. alone.

Occupancy has never dropped this fast or this far on a global scale. Hilton CEO Chris Nassetta has said that he expects occupancy to drop to 10 percent. “Hilton’s been around 100 years -- we’ve never closed a hotel that wasn’t going to be demolished or rebuilding,” he said. “The bulk of our hotels in the major cities are closing as we speak.” (Clark, 2020.)

[1] This is a fictional character created for the case.

The American Hotel & Lodging Association (AHLA) said at the beginning of April that the coronavirus had already had a more severe economic impact on the hotel industry than 9/11 and the recession combined. If restrictions expand and/or continue more than a few weeks, many cash-strapped properties may never be able to reopen (or may only do so under the direction of a lender after foreclosure). In that best case, hotels will see little or no occupancy for two to three months, with a slow ramp-up thereafter. Countries that are less effective at stopping the spread of the virus may see the biggest impact last for several months. (AHLA, 2020.)

Occupancy levels have never dropped so low. During 2007-2009 recession occupancy rates dropped on average to about 54 percent from about 70 percent pre-recession. After 9/11 occupancy rates dropped to about 59 percent. In Spring 2020 closing of hotels brought the occupancy rates down to 25 percent. Hotel Industry leaders such as Chip Rogers, President and CEO of AHLA, talk about full-year 2020 occupancy rates in the U.S. of 35 percent, down almost half from last year's 67 percent. (AHLA, 2020.)

MARRIOTT INTERNATIONAL

Marriott International, Inc. (NASDAQ: MAR) was founded in 1927 and is based in Bethesda, Maryland. The beginning of Marriott was not in hotel industry. In 1927, J. Willard Marriott at age 27 opened a nine-seat root beer stand in Washington, DC. He later added hot food to the menu and changed the name to The Hot Shoppe. In 1929 Marriott officially incorporated in the state of Delaware as Hot Shoppes, Inc. In 1939 company started a food service management business with an account at the U.S. Treasury building. Other accounts soon followed at government defense plant cafeterias. The company was first publicly listed in 1953 when the stock was offered to the public at $10.25 per share. The offering sold out in two hours of trading. It wasn't until 1957 that Marriott opened its first hotel, the Twin Bridges Marriott Motor Hotel, in Arlington, Virginia. (Marriott Investor Fact Book, page 5)

Today Marriott International has a portfolio of more than 7,300 properties under 30 leading brands spanning 134 countries and territories. Marriott operates and franchises hotels and licenses vacation ownership resorts all around the world. The 30 brands provide a range of experiences, locations, and price points. Brands are managed under a one-year-old Marriott Bonvoy program that was launched in February 2019. Bonvoy program was launched to consolidate under one umbrella different brands and three different loyalty programs after the merger with Starwood Hotels in fall 2016.

Marriott calls its business model "asset light." That means that Marriott builds hotels and sells them then to partnerships where they maintain the role of general partner and hotel operator. Marriott also franchises properties.

As a general partner Marriott earns two types of fees: a base management fee and an incentive fee. Management fee is around 3 percent of revenue. Incentive fee usually 25 percent of operating cash flow above the minimum threshold kept by owners. For these managed hotels Marriott provides all the personnel and owners of hotels reimburse Marriott 100 percent of the personnel expenses. Marriott also provides other services, like sales, marketing, managing loyalty programs and operating phone and online reservation systems. (Tully, 2017)

In the case of franchised properties, the revenue comes from a franchise royalty fee that is usually 5 to 6 percent of the room revenue. With these properties Marriott does not provide the personnel. Properties can decide to do their own sales and marketing or outsource it to Marriott. Loyalty program and reservation system is still provided by Marriott. (Tully, 2017)

According to Marriott's 2019 Annual Report, the company experienced steady growth and strong profitability in 2019. reflecting the strength of their brands, the Marriott Bonvoy loyalty program, and asset-light business model. Gross fee revenue increased 5 percent and reached $3.8 billion. Worldwide revenue per available room (RevPAR) rose 1.3 percent. Marriott's RevPAR index, which measures their hotels' revenue market share, increased by approximately 200 basis points. (Marriott 2019 Annual Report, 2020)

In 2019, Marriott added 516 properties with more than 78,000 rooms to their portfolio. Among the new properties was their 7,000th hotel — the stunning St. Regis in Hong Kong. They acquired Elegant Hotels Group, which includes seven hotels in Barbados. Marriott also purchased the W New York – Union Square with an objective to transform the hotel into a cutting-edge showcase property that will lead to increasing the prestige of the W hotel brand. In line with Marriott's asset-light strategy, they plan on putting these assets for sale, subject to long-term management agreements. (Marriott 2019 Annual Report, 2020)

Marriott also signed agreements for 815 additional properties with 136,000 additional rooms. This took their total global pipeline to approximately 515,000 rooms by the end of 2019. Marriott is one of the biggest and fastest growing players in the industry. In 2019, 7 percent of global industry rooms were under one of Marriott brands. Marriott's share of the industry's property "under construction" was 19 percent – the highest in the industry. (Marriott, 2019 10K)

In 2016 Marriott acquired Starwood anticipating revenue and cost synergies. During the past three years they have experienced lower costs for procurement and reservations. Profit margins in company operated properties have increased by 120 basis points over the past three years, even in a low RevPAR growth environment with rising wages. (Marriott 2019 Annual Report, 2020)

Marriott operates so called asset-light business strategy. This asset-light operating model means that majority of their worldwide rooms are managed or franchised. This allows Marriott to generate cash flow with minimal capital requirements.

Impact of COVID-19 on Marriott[2]

According to Marriott press release from March 18, 2020, company expects that the worldwide RevPAR declined approximately 23 percent in the first quarter of 2020, with RevPAR in North America down roughly 20 percent. Roughly 25 percent of the company's more than 7,300 hotels are temporarily closed, and they anticipate further hotel closures and erosion in RevPAR performance. (Marriott PR release, March 18, 2020.) Exhibit 8 gives more detailed information on the effect of the pandemic on the performance during the 1st quarter of 2020.

As the pandemic accelerated around the world, Marriott saw more significant occupancy and RevPAR declines in March than in February in all regions except Greater China. The company expects to report that in March RevPAR decreased approximately 60 percent worldwide, reflecting declines of around 57 percent in North America, 74 percent in Asia Pacific (with declines of 83 percent in Greater China and 68 percent in the rest of Asia), 71 percent in Europe, 57 percent in the Caribbean and Latin America, and 56 percent in the Middle East and Africa. (Marriott PR release, March 18, 2020.)

[2] You can watch the message from the President and CEO of Marriott International Inc., Arne Sorensen, dated March 20th, 2020, here: https://www.youtube.com/watch?v=SprFgoU6aO0&feature=youtu.be. You can also find links to messages from the CEOs of other major hotel companies here: https://www.ahla.com/covid-19s-impact-hotel-industry.

Marriott North American occupancy levels are around 10 percent, and more than 870 hotels (16 percent), are temporarily closed. Occupancy in Europe is currently under 10 percent, with around 500 hotels (79 percent) temporarily closed. The Middle East and Africa region currently has roughly 150 hotels (54 percent) temporarily closed, while hotels in the Caribbean and Latin America nearly 200 (69 percent) are temporarily closed. (Marriott PR release, March 18, 2020.) Marriott has extended the transient reservation cancellation window until June 30, 2020, for all existing reservations and is allowing cancellations without charge until 24 hours before the scheduled arrival for new reservations made between March 13, 2020 and June 30, 2020. For Marriott Bonvoy members, elite status earned in 2019 has been extended until February 2022. The expiration of Marriott Bonvoy points has also been paused until February 2021, at which time points will expire only if the account has been inactive for at least 24 months. (Marriott PR release, March 18, 2020.)

The company is also working to assist healthcare workers who are on the frontline in the fight against COVID-19. With support from its credit card partners, Marriott has committed to provide up to $10 million worth of hotel stays for healthcare professionals leading the fight against COVID-19 in the United States. The initiative, called Rooms for Responders, will provide free rooms in some of the areas in the United States most impacted by the virus. In addition, the company launched its Community Caregiver Program in the United States, Canada, the Caribbean and Latin America, which provides special rates for first responders and healthcare professionals who want to book rooms at hotels near the hospitals where they are working. Nearly 2,500 hotels are currently offering this rate. (Marriott PR release, March 18, 2020.)

Steps to Preserve Liquidity

On March 18, 2020 Marriott announced at least $140 million of estimated reductions to anticipated 2020 corporate general and administrative costs, including significant cuts in senior executive salaries. The company's actions to date have reduced the current monthly run rate of corporate general and administrative costs by approximately 30 percent compared to the monthly costs initially budgeted for 2020, excluding any bad debt expense that may be incurred. (Marriott PR release, March 18, 2020.)

At the property level, Marriott continues to work with owners and franchisees to lower their immediate cash outlays. On March 18, 2020, Marriott disclosed that it had deferred renovations, certain hotel initiatives and brand standard audits for hotel owners and franchisees. More recently, the company has taken additional steps, including reducing by 50 percent the cost of and offering delayed payment for certain systemwide programs and services charges for April and May, and supporting owners and franchisees who are working with their lenders to utilize furniture, fixtures, and equipment (FF&E) reserves to meet working capital needs. (Marriott PR release, March 18, 2020.)

As a result of additional reductions in anticipated corporate and system spending, Marriott expects to eliminate or defer around 40 percent of its February 19, 2020 yearly investment spending forecast of $700 million to $800 million, compared to the expected reduction of at least one-third disclosed on March 18, 2020. Marriott will continue to review its investment spending plans for 2020 and could see additional reductions, particularly in funding obligations related to new unit openings that may be delayed until 2021. On March 18, 2020, Marriott suspended share repurchases and cash dividends.

The impact of COVID-19 on the company remains fluid, as does the company's corporate and property-level response. There remains a great deal of uncertainty surrounding the trends and duration of that impact, requiring the company to plan for a wide range of scenarios for full year 2020. As a result of the operating and financial strategies the company has implemented, the company strongly believes that it has sufficient liquidity and will continue to be able to successfully adapt as the situation evolves.

Marriott Debt Obligations

Marriott has in total almost $12 billion in debt outstanding with $1.2 billion maturing in less than one year. Among the debt obligations is a $4.5B credit facility maturing in June 2024. This revolving credit facility contains certain covenants, including a financial covenant that limits Marriott's maximum leverage. This covenant consists of the ratio of Adjusted Total Debt[3] to EBITDA. Creditors check the adherence to the covenants for the last four fiscal quarters. Covenant states that the Adjusted Total debt to EBITDA cannot be more than 4 to 1. (Marriott International, Inc. 2019 Form 10K)

Table 1. Marriott Debt and Other Liabilities and their maturities.

Year	Debt Principal Payments ($ millions)
2020	$ 977.0
2021	$ 1,164.0
2022	$ 1,657.0
2023	$ 694.0
2024	$ 3,783.0
Thereafter	$ 2,665.0
Balance at the year-end 2019	$10,940.0

Source: Marriott International, Inc. Form 10K for 2019

On March 18th, Marriott issued a press release and filed form 8K with the SEC to report an unscheduled material event. The statement offered the following explanation:

"In the current environment, a major priority is preserving liquidity. Marriott has a $4.5 billion revolving credit facility that expires in June 2024 to provide liquidity when needed. As of March 17, the company has drawn down $2.5 billion primarily to support commercial paper maturities. The company's levers to preserve cash include reducing or eliminating share repurchases, suspending the cash dividend, reducing payroll and other costs and cutting back

[3] Adjusted total debt is the fair value of a company's total short-term, long-term, and off-balance sheet debt. Accounting Standards Update 2016-02, requires companies to record operating lease assets and liabilities on the balance sheet, and went into effect for calendar year 2019. (FASB, 2016) The adjustments/treatment of operating leases applies to periods prior to 2019.

investment spending. The company has not repurchased shares in 2020 other than the $150 million of share repurchases reported in the February 26, 2020 press release, and Marriott anticipates that its previously announced first quarter 2020 dividend, payable on March 31, 2020, will be the last until conditions improve. The company is also working with vendors and other partners in order to preserve working capital." (Marriott International, Inc. Form 8K filing, March 18, 2020)

On April 2, 2020, Marriott announced that it had borrowed $2.0 billion under the Credit Facility so that a total of $4.5 billion is outstanding. This will show up as long-term debt in the balance sheet going forward.

"Marriott increased its borrowings under the Credit Facility to increase its cash position and preserve financial flexibility in light of the impact on global markets resulting from the COVID-19 situation. The proceeds from the incremental Credit Facility borrowings are currently being held as cash, resulting in total cash and cash equivalents of approximately $3.7 billion as of April 2, 2020. As of April 2, 2020, Marriott has approximately $2.0 billion of commercial paper outstanding. The proceeds from the incremental Credit Facility borrowings may be used in the future to repay commercial paper when it matures and for general corporate or other purposes permitted by the Credit Facility."(Marriott International, Inc. Form 8K filing, April 2, 2020)

On April 13th, Marriott announced the signing of a new $1.5 billion 364-day revolving credit commitment with Bank of America. They also announced the waiver for the leverage covenant for the existing credit facility.

"Marriott entered into the First Amendment to its Fifth Amended and Restated Credit Agreement with Bank of America, N.A., as administrative agent, and certain banks, dated as of June 28, 2019. The Amendment waives the quarterly-tested leverage covenant in the Credit Facility through and including the first quarter of 2021 (which waiver period may end sooner at the Company's election), adjusts the required leverage levels for the covenant when it is re-imposed at the end of the waiver period, and imposes a new monthly-tested liquidity covenant for the duration of the waiver period. The Amendment also makes certain other amendments to the terms of the Credit Facility, including increasing the interest and fees payable on the Credit Facility for the duration of the period during which the waiver of the leverage covenant remains in effect, tightening certain existing covenants and imposing additional covenants for the duration of the waiver period. These covenant changes include tightening the lien covenant and the covenant on dividends, share repurchases and distributions, and imposing new covenants limiting asset sales, investments and discretionary capital expenditures. The $4.5 billion aggregate commitment amount of the Credit Facility remains unchanged." (Marriott International, Inc. Form 8K filing, April 13, 2020)

Guarantees for Potential Future Borrowing

In the 2019 Annual Report Marriott states that they issue guarantees to certain lenders and hotel owners, in order to obtain long-term management and franchise contracts. These guarantees have a stated maximum funding amount and a term of three to ten years. The terms of guarantees to lenders generally require Marriott to fund the debt service if the cash flows from hotel operations are inadequate to cover annual debt service or to repay the loan at maturity. The terms of the

guarantees to hotel owners generally require Marriott to step in if the hotels do not attain specified levels of operating profit. Guarantee fundings to lenders and hotel owners are generally recoverable out of future hotel cash flows and/or proceeds from the sale or refinancing of hotels. In addition, Marriott has project completion guarantee commitments with certain lenders in related to the hotels that they or their joint venture partners are building. The maximum potential amount of our future guarantee fundings and the carrying amount of liability for debt service is in the following table:

Table 2. Marriott Guarantees by Type in 2019

Guarantee Type ($ in millions)	**Maximum Potential Amount of Future Fundings**	**Recorded Liability for Guarantees**
Debt Service	$ 53	$ 6
Operating Profit	$ 231	$ 142
Other	$ 15	$ 3
Total	**$ 299**	**$ 151**

Source: Marriott International, Inc Form 10K for 2019

Marriott liability at year-end of 2019 for guarantees for which they are the primary obligor is reflected on the balance sheet as $16 million of “accrued expenses and other” and $135 million of “other noncurrent liabilities.”

Marriott Credit Rating

On March 23rd, 2020, Moody's Investors Service downgraded the credit rating of Marriott International, Inc. The rating for Marriott’s senior unsecured debt was downgraded to Baa3 from Baa2. At the same time, Moody's placed the company's ratings under review for further downgrade. Pete Trombetta, Moody’s analyst for the lodging and cruise industry, stated:

"The downgrade reflects the material earnings decline Marriott will experience in 2020 due to travel restrictions being put in place across the US related to the spread of the COVID-19 coronavirus which will cause the company's leverage to increase to above its downgrade trigger of 3.75x. Occupancy and revenue per available room (RevPAR) in the US fell significantly over the past two weeks and are expected to remain weak until the travel restrictions are lifted. Marriott's ability to bring its metrics back to historic levels will be delayed by our expectation for a prolonged recovery." (Moody’s, 2020)

Share Repurchases

In the last three years Marriott has returned over $9.8 billion to stockholders through dividends and share repurchases. In 2019 the annual dividend was $1.85 per share, a more than 18 percent increase from 2018. Compared to annual closing price Marriott’s dividend yield was 1.23 percent. In 2019 Marriott repurchased 17.3 million shares for the total amount of $2.26 billion,

giving investors a buyback yield of 4.36 percent. Together dividend and buyback yield add up to a total yield of 5.58 percent on cash returned to investors, a payout ratio of almost 46 percent.

Table 3. Marriott International Share Repurchases in 2019

(in millions, except per share amounts)	Total Number of Shares Purchased	Average Price per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Number of Shares That May Yet Be Purchased Under the Plans or Programs	Total amount in USD millions
January	-	$-	-	10.70	
February	2.40	$ 126.31	2.40	33.30	$ 303.14
March	4.30	$ 122.97	4.30	29.00	$ 528.77
Apil	1.20	$ 133.60	1.20	27.80	$ 160.32
May	1.40	$ 130.10	1.40	26.40	$ 182.14
June	1.10	$ 134.05	1.10	25.30	$ 147.46
July	1.50	$ 140.36	1.50	23.80	$ 210.54
August	2.10	$ 129.02	2.10	21.70	$ 270.94
September	0.20	$ 127.20	0.20	21.50	$ 25.44
October	—	$—	—	21.50	
November	1.60	$ 134.96	1.60	19.90	$ 215.94
December	1.50	$ 145.13	1.50	18.40	$ 217.70
Total	**17.30**				**$ 2,262.38**

Source: Marriott International, Inc. Form 10Q for 2019.

Stephanie has reviewed the financials and read through the industry reports. There is no time to waste as Ms. Oberg is expecting her feedback and recommendations. She has made a list of tasks she has to complete:

1. Complete historical financial statement analysis for Marriott by using common-size statements, horizontal analysis, and ratio analysis. Pay special attention and focus on capital structure, leverage, and debt service.

2. Create a forecast of the financial statements for 2020 and 2021 by combining percentage of sales and t-account method. To decide on your forecasting assumptions, you can use information from your historical financial statement analysis and information provided in the body of the case about the effects of COVID-19 on the hotel industry.

3. Calculate ratios for the forecasted financial statements with special focus on capital structure, leverage, and debt service.

4. Add scenario analysis to your forecasts by looking at least at two additional scenarios, one of which is more pessimistic than your base case forecast.

5. For each scenario identify the future financing needs for Marriott during 2020. Identify key factors that affect financing needs.

6. Using sensitivity analysis determine which of these factors are the most important

7. How does the new capital structure affect the expected cost of capital?

8. Based on your analysis, write a memo to the management of Marriott that includes your recommendations regarding the capital structure and financing needs.

Exhibit 1. Number of Hotels and Rooms Operated by Marriott in 2019

as of end of 4th quarter	**2016**		**2017**		**2018**		**2019**	
	Units	**Rooms**	**Units**	**Rooms**	**Units**	**Rooms**	**Units**	**Rooms**
Worldwide:								
Owned	22	9,906	19	7,337	14	5,913	20	6,059
Leased	48	10,933	48	10,932	49	11,182	48	10,944
Managed	1,777	516,373	1,815	527,527	1,873	540,118	1,990	558,651
Franchised	4,005	614,350	4,338	662,800	4,641	706,816	5,105	772,878
Residences	45	5,234	82	9,257	89	9,957	95	9,868
Timeshare	83	20,702	89	22,154	89	22,186	91	22,521
Total	**6,080**	**1,190,604**	**6,520**	**1,257,666**	**6,906**	**1,317,368**	**7,349**	**1,380,921**
North America:								
Owned	11	5,933	8	3,364	7	3,404	6	2,962
Leased	22	4,872	22	4,877	22	4,877	22	4,877
Managed	792	245,605	774	245,218	766	242,301	759	239,705
Franchised	3,591	524,738	3,877	564,196	4,133	597,379	4,477	645,704
Residences	36	4,813	57	6,750	59	6,959	60	6,557
Timeshare	66	17,127	70	18,281	70	18,313	72	18,668
Total	**4,529**	**805,001**	**4,839**	**847,974**	**5,106**	**881,680**	**5,396**	**918,473**
International:								
Owned	11	3,973	11	3,973	7	2,509	14	3,097
Leased	26	6,061	26	6,055	27	6,305	26	6,067
Managed	985	270,768	1,041	282,309	1,107	297,817	1,231	318,946
Franchised	414	89,612	461	98,604	508	109,437	628	127,174
Residences	9	421	25	2,507	30	2,998	35	3,311
Timeshare	17	3,575	19	3,873	19	3,873	19	3,853
Total	**1,551**	**385,603**	**1,681**	**409,692**	**1,800**	**435,688**	**1,953**	**462,448**

Source: Marriott International, Inc. Form 10Q reports for 2019 (Marriott Investor Relations homepage)

Exhibit 2. Marriott North America Lodging Key Operating Statistics [1]

	2016 [4]	2017	2018	2019
Composite North American Luxury				
Occupancy (%)	76.30	77.30	77.02	77.23
Average Daily Rate ($)	$ 317.13	$ 300.34	$ 318.54	$ 333.61
RevPar ($) [2]	$ 242.10	$ 232.19	$ 245.35	$ 257.63
RevPar Change (%) [3]	2.80	2.80	3.46	1.79
Composite North American Upper Upscale				
Occupancy (%)	76.10	73.70	73.47	73.83
Average Daily Rate ($)	$ 196.98	$ 177.87	$ 180.54	$ 182.97
RevPar ($) [2]	$ 149.92	$ 131.11	$ 132.64	$ 135.10
RevPar Change (%) [3]	2.30	2.00	1.80	2.10
Composite North American Full-Service				
Occupancy (%)	76.20	74.10	73.82	74.18
Average Daily Rate ($)	$ 219.25	$ 191.25	$ 194.59	$ 198.88
RevPar ($) [2]	$ 166.97	$ 141.70	$ 143.64	$ 147.53
RevPar Change (%) [3]	2.40	2.10	2.06	2.04
Composite North American Limited-Service				
Occupancy (%)	75.00	74.60	74.31	73.76
Average Daily Rate ($)	$ 141.68	$ 131.74	$ 133.61	$ 135.14
RevPar ($) [2]	$ 106.20	$ 98.29	$ 99.29	$ 99.67
RevPar Change (%) [3]	2.80	2.00	0.93	(0.04)
Composite North American Systemwide [5]				
Occupancy (%)	74.20	74.40	74.10	73.93
Average Daily Rate ($)	$ 157.00	$ 158.05	$ 159.94	161.79
RevPar ($) [2]	$ 116.47	$ 117.56	$ 118.51	119.61
RevPar Change (%) [3]	2.30	2.10	1.53	1.03

(1) Statistics are for managed hotels opened for a full year (called comparable hotels). (2) Revenue per Available Room. (3) Year over year change of a consistent group of comparable hotels. Comparable hotel base changes each year based on hotel openings. (4) Combined Company statistics assume Marriott's acquisition of Starwood had been completed on January 1,2015. (5) Statistics are for managed and franchised hotels opened for a full year (called comparable hotels).

Exhibit 3. Selected Financial Data, 2010 – 2019

The following table presents a summary of selected historical financial data for the past 10 years.

	2010	**2011**	**2012**	**2013** (1)	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Income Statement Data:										
Revenues (6)	$11,691	$12,317	$ 11,814	$12,784	$13,796	$ 14,486	$ 15,407	$20,452	$ 20,758	$ 20,972
Operating income (loss)	$ 695	$ 526	$ 940	$ 988	$ 1,159	$ 1,350	$ 1,424	$ 2,504	$ 2,366	$1800 (6)
Net income (loss) (6)	**$ 458**	**$ 198**	**$ 571**	**$ 626**	**$ 753**	**$ 859**	**$ 808**	**$ 1,459**	**$ 1,907**	**$ 1,273**
Per Share Data:										
Diluted earnings (losses) per share (6)	$ 1.21	$ 0.55	$ 1.72	$ 2.00	$ 2.54	$ 3.15	$ 2.73	$ 3.84	$ 5.38	$ 3.80
Cash dividends declared per share	$ 0.21	$ 0.39	$ 0.49	$ 0.64	$ 0.77	$ 0.95	$ 1.15	$ 1.29	$ 1.56	$ 1.85
Balance Sheet Data (at year-end):										
Total assets (4) (6) (7)	$ 8,983	$ 5,910	$ 6,342	$ 6,794	$ 6,833	$ 6,082	$24,078	$23,846	$23,696	$ 25,051
Long-term debt (4)	$ 2,691	$ 1,816	$ 2,528	$ 3,147	$ 3,447	$ 3,807	$ 8,197	$ 7,840	$ 8,514	$ 9,963
Shareholders' equity (deficit) (6)	**$ 1,585**	**$(781)**	**$(1,285)**	**$(1,415)**	**$(2,200)**	**$(3,590)**	**$ 6,265**	**$ 3,582**	**$ 2,225**	**$ 703**
Other Data:										
Base management fees	$ 562	$ 602	$ 581	$ 621	$ 672	$ 698	$ 806	$ 1,102	$ 1,140	$ 1,180
Franchise fees (5) (6)	$ 441	$ 506	$ 607	$ 697	$ 872	$ 984	$ 1,157	$ 1,586	$ 1,849	$ 2,006
Incentive management fees	$ 182	$ 195	$ 232	$ 256	$ 302	$ 319	$ 425	$ 607	$ 649	$ 637
Total fees (5) (6)	**$ 1,185**	**$1,303**	**$ 1,420**	**$ 1,574**	**$ 1,846**	**$ 2,001**	**$ 2,388**	**$ 3,295**	**$ 3,638**	**$ 3,823**
Fee Revenue-Source:										
North America (2) (5) (6)	$ 878	$ 970	$ 1,074	$ 1,200	$ 1,439	$ 1,586	$ 1,845	$ 2,388	$ 2,641	$ 2,791
Total Outside North America (3) (5) (6)	$ 307	$ 333	$ 346	$ 374	$ 407	$ 415	$ 543	$ 907	$ 997	$ 1,032
Total fees (5) (6)	**$ 1,185**	**$1,303**	**$ 1,420**	**$ 1,574**	**$ 1,846**	**$ 2,001**	**$ 2,388**	**$ 3,295**	**$ 3,638**	**$ 3,823**

Exhibit 4. Selected Financial Data, 2010 – 2019 (continued)

(1) In 2013, Marriott changed to a calendar year-end reporting cycle. All fiscal years presented before 2013 included 52 weeks. (2) Represents fee revenue from the U.S. (but not Hawaii before 2011) and Canada. (3) Represents fee revenue outside of North America, as defined in footnote (2) above. (4) In 2015, Marriott adopted ASU No. 2015-03, which changed the presentation of debt issuance costs, and ASU No. 2015-17, which changed the classification of deferred taxes. Years before 2014 are not adjusted for these new accounting standards. (5) In 2017, Marriott reclassified branding fees for third-party residential sales and credit card licensing to the "Franchise fees" caption from the "Owned, leased, and other revenue" caption on the Income Statements. They reclassified prior period amounts through 2013 to conform to current presentation but did not reclassify amounts for years before 2013. (6) In 2018, Marriott adopted ASU 2014-09, which impacted recognition of revenues and certain expenses. Years before 2016 are not adjusted for this new accounting standard. (7) In 2019, Marriott adopted ASU No. 2016-02, which brought all leases onto the balance sheet. Years before 2019 have not been adjusted for this new accounting standard.

Exhibit 5. Marriott International, Inc. Income Statement, 2015-2019

Fiscal year is January-December. $ in millions	**2015**	**2016**	**2017**	**2018**	**2019**
Total Available rooms	759,330	1,190,604	1,257,666	1,317,368	1,380,921
Revenues					
Base management fees	$ 698	$ 806	$ 1,102	$ 1,140	$ 1,180
Franchise fees	$ 984	$ 1,157	$ 1,586	$ 1,849	$ 2,006
Incentive management fees	$ 319	$ 425	$ 607	$ 649	$ 637
Owned, leased, corporate housing, and other revenue	$ 855	$ 1,125	$ 1,752	$ 1,635	$ 1,612
Cost reimbursements	$ 11,630	$ 11,934	$ 15,455	$ 15,543	$ 15,599
Total Revenue	**$ 14,476**	**$ 15,407**	**$ 20,452**	**$ 20,758**	**$ 20,972**
Operating costs and expenses					
Owned, leased, and other direct	$ 733	$ 901	$ 1,411	$ 1,306	$ 1,316
Depreciation, amortization & other	$ 139	$ 119	$ 229	$ 226	$ 341
SG&A Expense	$ 634	$ 743	$ 921	$ 927	$ 938
Merger-related costs and charges	$ -	$ 386	$ 159	$ 155	$ 138
Reimbursed expenses	$ 11,630	$ 11,834	$ 15,228	$ 15,778	$ 16,439
Total operating costs and expenses	**$ 13,136**	**$ 13,983**	**$ 17,948**	**$ 18,392**	**$ 19,172**
Operating Income	**$ 1,350**	**$ 1,424**	**$ 2,504**	**$ 2,366**	**$ 1,800**
Non-Operating Income/Expense	$ 27	$ 5	$ 688	$ 194	$ 154
Equity earnings	$ 16	$ 9	$ 40	$ 103	$ 13
EBIT	**$ 1,393**	**$ 1,438**	**$ 3,232**	**$ 2,663**	**$ 1,967**
Non-Operating Interest Income	$ 29	$ 35	$ 38	$ 22	$ 26
Interest Expense	$ 167	$ 234	$ 288	$ 340	$ 394
Pretax Income	**$ 1,255**	**$ 1,239**	**$ 2,982**	**$ 2,345**	**$ 1,599**
Income Tax	$ 396	$ 431	$ 1,523	$ 438	$ 326
Net Income	**$ 859**	**$ 808**	**$ 1,459**	**$ 1,907**	**$ 1,273**
EPS (Basic)	$ 3.22	$ 2.78	$ 3.84	$ 5.38	$ 3.79
Basic Shares Outstanding (millions)	267	291	375	350	333
EPS (Diluted)	$ 3.15	$ 2.73	$ 3.84	$ 5.38	$ 3.79
Diluted Shares Outstanding (millions)	273	296	380	354	336
EBITDA	**$ 1,517**	**$ 1,922**	**$ 2,942**	**$ 2,805**	**$ 2,341**

Exhibit 6. Marriott International, Inc. Balance Sheet, 2015-2019

Fiscal year is January-December. $ in millions	**2015**	**2016**	**2017**	**2018**	**2019**
Cash and equivalents	$ 96	$ 858	$ 383	$ 316	$ 225
Accounts and notes receivable	$ 1,103	$ 1,695	$ 1,973	$ 2,133	$ 2,395
Prepaid expenses	$ 107	$ 230	$ 235	$ 249	$ 252
Assets held for sale	$ 78	$ 588	$ 149	$ 8	$ 255
Total Current Assets	**$ 1,384**	**$ 3,371**	**$ 2,740**	**$ 2,706**	**$ 3,127**
Net Property & Equipment	$ 1,029	$ 2,335	$ 1,793	$ 1,956	$ 1,904
Property, Plant & Equipment - Gross	$ 1,926	$ 3,320	$ 2,890	$ 3,473	$ 4,093
Land & Improvements	$ 299	$ 654	$ 601	$ 591	$ 684
Buildings	$ 729	$ 1,352	$ 1,052	$ 1,275	$ 1,100
Furniture and equipment	$ 768	$ 1,159	$ 1,121	$ 1,439	$ 1,225
Construction in Progress	$ 130	$ 155	$ 116	$ 168	$ 196
Accumulated Depreciation	$ 897	$ 985	$ 1,097	$ 1,517	$ 1,301
Intangible Assets	$ 2,394	$ 16,868	$ 17,751	$ 17,419	$ 17,689
Brands	$ 197	$ 6,509	$ 5,922	$ 5,790	$ 5,954
Goodwill	$ 943	$ 7,598	$ 9,207	$ 9,039	$ 9,048
Contract acquisition costs and other	$ 1,254	$ 2,761	$ 2,622	$ 2,590	$ 2,687
Equity method investments	$ 165	$ 728	$ 734	$ 732	$ 577
Long-Term Note Receivable	$ 215	$ 245	$ 142	$ 125	$ 117
Deferred tax assets	$ 672	$ 116	$ 93	$ 171	$ 154
Operating lease assets	$ -	$ -	$ -	$ -	$ 888
Other noncurrent assets	$ 223	$ 477	$ 593	$ 587	$ 595
Total noncurrent assets	**$ 4,698**	**$ 20,769**	**$ 21,106**	**$ 20,990**	**$ 21,924**
Total assets	**$ 6,082**	**$ 24,140**	**$ 23,846**	**$ 23,696**	**$ 25,051**

Exhibit 6. Marriott International, Inc. Balance Sheet (continued)

($ in millions)	**2015**	**2016**	**2017**	**2018**	**2019**
Short Term Debt	$ -	$ -	$ -	$ -	$ -
Current Portion of Long-Term Debt	$ 300	$ 309	$ 398	$ 833	$ 977
Accounts Payable	$ 593	$ 687	$ 783	$ 767	$ 720
Accrued Payroll	$ 861	$ 1,174	$ 1,214	$ 1,348	$ 1,339
Liability for guest loyalty program	$ 952	$ 1,866	$ 2,121	$ 2,529	$ 2,258
Accrued expenses and other	$ 527	$ 1,111	$ 1,291	$ 963	$ 1,383
Total Current Liabilities	**$ 3,233**	**$ 5,147**	**$ 5,807**	**$ 6,437**	**$ 6,677**
Long-Term Debt	$ 3,807	$ 8,197	$ 7,840	$ 8,514	$ 9,963
Liability for guest loyalty program	$ 1,622	$ 2,675	$ 2,819	$ 2,932	$ 3,460
Deferred taxes	$ 16	$ 1,020	$ 605	$ 485	$ 290
Deferred revenue	$ -	$ -	$ 583	$ 731	$ 840
Operating lease liabilities	$ -	$ -	$ -	$ -	$ 882
Other noncurrent liabilities	$ 994	$ 1,744	$ 2,610	$ 2,372	$ 2,236
Total noncurrent liabilities	**$ 6,439**	**$ 13,636**	**$ 14,457**	**$ 15,034**	**$ 17,671**
Total Liabilities	**$ 9,672**	**$ 18,783**	**$ 20,264**	**$ 21,471**	**$ 24,194**
Shareholder Equity					
Common stock Par/Carry Value	$ 5	$ 5	$ 5	$ 5	$ 5
Additional Paid-In Capital	$ 2,821	$ 5,808	$ 5,770	$ 5,814	$ 5,800
Retained Earnings	$ 4,878	$ 6,501	$ 7,242	$ 8,982	$ 9,644
Treasury Stock	$ (11,098)	$ (6,460)	$ (9,418)	$ (12,185)	$ (14,385)
Accumulated other comprehensive income (loss)	$ (196)	$ (497)	$ (17)	$ (391)	$ (361)
Total Equity	**$ (3,590)**	**$ 5,357**	**$ 3,582**	**$ 2,225**	**$ 703**
Liabilities & Shareholders' Equity	**$ 6,082**	**$ 24,140**	**$ 23,846**	**$ 23,696**	**$ 25,051**

Exhibit 7. Marriott International, Inc. Cash Flow Statement, 2015-2019

Fiscal year is January-December. $ in millions	**2015**	**2016**	**2017**	**2018**	**2019**
Cash Flow from Operating Activities, Indirect					
Income/Loss before Non-Cash Adjustment	$ 859	$ 780	$ 1,372	$ 1,907	$ 1,273
Depreciation, Amortization and Depletion, Non-Cash Adjustment	$ 139	$ 168	$ 290	$ 284	$ 403
Stock-Based Compensation, Non-Cash Adjustment	$ 113	$ 212	$ 181	$ 184	$ 187
Taxes, Non-Cash Adjustment	$ 143	$ 76	$ 828	$ (239)	$ (200)
Irregular Income/Loss, Non-Cash Adjustment	$ -	$ 113	$ (811)	$ (178)	$ (61)
Other Non-Cash Items	$ 302	$ 410	$ 495	$ 627	$ 551
Changes in Operating Capital	$ (126)	$ (177)	$81	$ (76)	$ (273)
Cash Generated from Operating Activities	$ 1,430	$ 1,582	$ 2,436	$ 2,509	$ 1,880
Other Operating Cash Flow				$ (152)	$ (195)
Cash Flow from Operating Activities, Indirect	**$ 1,430**	**$ 1,582**	**$ 2,436**	**$ 2,357**	**$ 1,685**
Cash Flow from Investing Activities					
Capital Expenditure, Reported	$ (305)	$ (199)	$ (240)	$ (556)	$ (653)
Cash Advances and Loans Made to Other Parties	$ (66)	$ (32)	$ (93)	$ (13)	$ (30)
Cash Receipts from Repayment of Advances	$ 92	$ 67	$ 187	$ 48	$ 51
Sale of Business	$ 673	$ 218	$ 1,418	$ 479	$ 395
Purchase/Acquisition of Business	$ (258)	$ (2,492)	$ (189)	-	-
Other Investing Cash Flow	$ 231	$ 29	$ (63)	$ (10)	$ (47)
Cash Flow from Investing Activities	**$ 367**	**$ (2,409)**	**$ 1,020**	**$ (52)**	**$ (284)**
Cash Flow from Financing Activities					
Proceeds from Issuance of Common Stock	$ 40	$ 34	$ 6	$ 4	$ 7
Payments for Common Stock	$ (1,917)	$ (568)	$ (3,013)	$ (2,850)	$ (2,260)
Proceeds from Issuance of Long-Term Debt	$ 650	$ 2,847	$ 25	$ 1,517	$ 2,348
Repayments for Long Term Debt	$ (325)	$ (326)	$ (310)	$ (397)	$ (835)
Cash Dividends Paid	$ (253)	$ (374)	$ (482)	$ (543)	$ (612)
Other Financing Cash Flow		$ (24)	$ (157)	$ (105)	$ (156)
Cash Flow from Financing Activities	**$ (1,805)**	**$ 1,589**	**$ (3,931)**	**$ (2,374)**	**$ (1,508)**
Change in Cash	$ (8)	$ 762	$ (475)	$ (69)	$ (107)
Cash and Cash Equivalents, Beginning of Period	$ 104	$ 96	$ 858	$ 429	$ 360
Cash and Cash Equivalents, End of Period	**$ 96**	**$ 858**	**$ 383**	**$ 360**	**$ 253**

Exhibit 8. Marriott RevPAR, Occupancy, and Average Daily Rate statistics for 1st quarter of 2020

Comparable Company-Operated Properties

Three months ended March 31, 2020 and change vs. three months ended March 31, 2019

	RevPAR			Occupancy			Average Daily Rate		
	2020	**vs.**	**2019**	**2020**	**vs.**	**2019**	**2020**	**vs.**	**2019**
North America	$ 117.00		-21.8%	57%		-15.1%	$ 206.15		-1.0%
Asia Pacific	$ 56.24		-43.3%	38%		-28.4%	$ 147.12		-1.1%
Caribbean and Latin America	$ 130.13		-19.2%	54%		-11.7%	$ 239.59		-1.8%
Europe	$ 84.07		-25.0%	48%		-15.9%	$ 173.56		-0.5%
Middle East & Africa	$ 88.71		-19.6%	59%		-10.5%	$ 151.37		-5.3%
Total International	$ 74.16		-32.0%	45%		-21.1%	$ 163.28		-0.4%
Total Worldwide	**$ 94.61**		**-26.3%**	**51%**		**-18.2%**	**$ 186.13**		**0.1%**

Comparable Systemwide Properties

Three months ended March 31, 2020 and change vs. three months ended March 31, 2019

	RevPAR			Occupancy			Average Daily Rate		
	2020	**vs.**	**2019**	**2020**	**vs.**	**2019**	**2020**	**vs.**	**2019**
North America	$ 89.64		-19.5%	56.7%		-12.4%	$ 158.14		-1.8%
Asia Pacific	$ 58.62		-41.5%	39.5%		-27.5%	$ 148.44		-0.8%
Caribbean and Latin America	$ 100.18		-19.8%	525.2%		-12.2%	$ 191.80		-1.0%
Europe	$ 73.76		-24.6%	47.5%		-15.3%	$ 155.19		-0.4%
Middle East & Africa	$ 84.72		-19.6%	58.3%		-10.3%	$ 145.32		-5.4%
Total International	$ 71.80		-30.4%	46.1%		-19.6%	$ 155.77		-0.9%
Total Worldwide	**$ 84.51**		**-22.5%**	**53.6%**		**-14.5%**	**$ 157.55**		**-1.5%**

Source: Marriott International, Inc. Form 10Q.

Exhibit 9. Marriott International, Inc. Long-Term Debt

($ in millions)	At Year-End 2018	At Year-End 2019
K Notes, interest rate of 3.0%, face amount of $600, matured March 1, 2019 (effective interest rate of 4.4%)	$ 600	--
L Notes, interest rate of 3.3%, face amount of $350, maturing September 15, 2022 (effective interest rate of 3.4%)	$ 349	$ 349
M Notes, interest rate of 3.4%, face amount of $350, maturing October 15, 2020 (effective interest rate of 3.6%)	$ 349	$ 349
N Notes, interest rate of 3.1%, face amount of $400, maturing October 15, 2021 (effective interest rate of 3.4%)	$ 397	$ 398
O Notes, interest rate of 2.9%, face amount of $450, maturing March 1, 2021 (effective interest rate of 3.1%)	$ 448	$ 449
P Notes, interest rate of 3.8%, face amount of $350, maturing October 1, 2025 (effective interest rate of 4.0%)	$ 345	$ 346
Q Notes, interest rate of 2.3%, face amount of $750, maturing January 15, 2022 (effective interest rate of 2.5%)	$ 745	$ 747
R Notes, interest rate of 3.1%, face amount of $750, maturing June 15, 2026 (effective interest rate of 3.3%)	$ 743	$ 744
T Notes, interest rate of 7.2%, face amount of $181, matured December 1, 2019 (effective interest rate of 2.3%)	$ 188	—
U Notes, interest rate of 3.1%, face amount of $291, maturing February 15, 2023 (effective interest rate of 3.1%)	$ 291	$ 291
V Notes, interest rate of 3.8%, face amount of $318, maturing March 15, 2025 (effective interest rate of 2.8%)	$ 335	$ 332
W Notes, interest rate of 4.5%, face amount of $278, maturing October 1, 2034 (effective interest rate of 4.1%)	$ 292	$ 291
X Notes, interest rate of 4.0%, face amount of $450, maturing April 15, 2028(effective interest rate of 4.2%)	$ 443	$ 444
Y Notes, floating rate, face amount of $550, maturing December 1, 2020(effective interest rate of 2.5% at December 31, 2019)	$ 547	$ 549
Z Notes, interest rate of 4.2%, face amount of $350, maturing December 1, 2023(effective interest rate of 4.4%)	$ 347	$ 347
AA Notes, interest rate of 4.7%, face amount of $300, maturing December 1, 2028 (effective interest rate of 4.8%)	$ 297	$ 297
BB Notes, floating rate, face amount of $300, maturing March 8, 2021 (effective interest rate of 2.5% at December 31, 2019)	—	$ 299
CC Notes, interest rate of 3.6%, face amount of $550, maturing April 15, 2024 (effective interest rate of 3.9%)	—	$ 564
DD Notes, interest rate of 2.1%, face amount of $550, maturing October 3, 2022 (effective interest rate of 2.4%)	—	$ 543
Commercial paper	$ 2,245	$ 3,197
Finance lease obligations	$ 163	$ 157
Other	$ 223	$ 247
	$ 9,347	**$ 10,940**
Less: Current portion of long-term debt	$ (833)	$ (977)
	$ 8,514	**$ 9,963**

Source: Marriott International, Inc. 2019 Form 10K

Exhibit 10. Marriott International, Inc. Senior Unsecured Notes

CUSIP	Callable Yes/No	Offer Date	Maturity	Coupon rate	Original Offering USD millions	Amount Outstanding USD millions	Moody's Rating	S&P Rating
571900BB4	Yes	3/6/2019	4/15/2024	3.600%	$ 550.0	$ 550.0	Baa3	BBB
571900BA6	No	3/6/2016	3/8/2021	1.649%	$ 300.0	$ 300.0	Baa3	BBB
571903AL7	Yes	9/24/2013	10/15/2020	3.375%	$ 350.0	$ 350.0	Baa3	BBB
571903AK9	Yes	9/5/2012	9/15/2022	3.250%	$ 350.0	$ 350.0	Baa3	BBB
571903AM5	Yes	10/6/2014	10/15/2021	3.125%	$ 400.0	$ 400.0	Baa3	BBB
571903AN3	Yes	9/9/2015	3/1/2021	2.875%	$ 450.0	$ 450.0	Baa3	BBB
571903AP8	Yes	9/9/2015	10/1/2025	3.750%	$ 350.0	$ 350.0	Baa3	BBB
571903AR4	Yes	6/7/2016	1/15/2022	2.300%	$ 750.0	$ 750.0	Baa3	BBB
571903AS2	Yes	6/7/2016	6/15/2026	3.125%	$ 750.0	$ 750.0	Baa3	BBB
571903AV5	Yes	12/9/2016	2/15/2023	3.125%	$ 291.0	$ 291.0	Baa3	BBB
571903AW3	Yes	12/9/2016	3/15/2025	3.750%	$ 317.8	$ 317.8	Baa3	BBB
571903AX1	Yes	12/9/2016	10/1/2034	4.500%	$ 277.6	$ 277.6	Baa3	BBB
571903AY9	Yes	4/3/2018	4/15/2028	4.000%	$ 450.0	$ 450.0	Baa3	BBB
571903AZ6	-	11/13/2018	12/1/2020	2.180%	$ 550.0	$ 550.0	Baa3	BBB
571903BA0	Yes	11/13/2018	12/1/2023	4.150%	$ 350.0	$ 350.0	Baa3	BBB
571903BB8	Yes	11/13/2018	12/1/2028	4.650%	$ 300.0	$ 300.0	Baa3	BBB
571903BC6	Yes	10/1/2019	10/3/2022	2.125%	$ 550.0	$ 550.0	Baa3	
571903BD4	Yes	4/14/2020	5/1/2025	5.750%	$ 1,600.0	$ 1,600.0		

Source: FINRA Morningstar Bond Data, retrieved on 4/16/2020

Exhibit 11. Marriott International, Inc. Fair Value of Financial Instruments (1)

	At Year-End 2019		At Year-End 2018	
($ in millions)	**Carrying Amount**	**Fair Value**	**Carrying Amount**	**Fair Value**
Senior, mezzanine, and other loans	$ 117	$ 112	$ 125	$ 116
Total noncurrent financial assets	$ 117	$ 112	$ 125	$ 116
Senior Notes	($6,441)	($6,712)	($5,928)	($5,794)
Commercial paper	($3,197)	($3,197)	($2,245)	($2,245)
Other long-term debt	($174)	($179)	($184)	($182)
Other noncurrent liabilities	($196)	($196)	($153)	($153)
Total noncurrent financial liabilities	($10,008)	($10,284)	($8,510)	($8,374)

(1) Marriott applies the provisions of fair value measurement to various nonrecurring measurements for financial and nonfinancial assets and liabilities. Accounting standards define fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date, also called an exit price. Marriott measures their assets and liabilities using inputs from the following three levels of the fair value hierarchy: Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities that we have the ability to access at the measurement date. Level 2 inputs include quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable for the asset or liability (i.e., interest rates, yield curves, etc.), and inputs that are derived principally from or corroborated by observable market data by correlation or other means (market corroborated inputs). Level 3 includes unobservable inputs that reflect assumptions about what factors market participants would use in pricing the asset or liability. (Marriott 2019 10-k, Note 2, p. 60)

Marriott estimates the fair value of senior, mezzanine, and other loans by discounting cash flows using risk-adjusted rates, which are Level 3 inputs. They estimate the fair value of other long-term debt, excluding leases, using expected future payments discounted at risk-adjusted rates, which are Level 3 inputs. Fair value of Senior Notes is determined using quoted market prices, which are directly observable Level 1 inputs. Marriott classifies outstanding commercial paper borrowings as long-term based on their ability and intent to refinance them on a long-term basis. They use pricing from recent transactions as Level 2 inputs in estimating fair value for commercial papers. At year-end 2019 and year-end 2018, Marriott determined that the carrying value of commercial paper approximated fair value due to the short maturity. Marriott's other noncurrent liabilities largely consist of guarantees which are measured at fair value on a nonrecurring basis. At year-end 2019 and year-end 2018, the carrying values of guarantee liabilities approximated their fair values based on Level 3 inputs. (Marriott International, Inc. 2019 Form 10K, Note 13, p 75)

Exhibit 12. Marriott International, Inc. Commitments by Maturity, as of the end of 2019

($ in millions)	**2020**	**2021**	**2022**	**2023**	**2024**	**There-after**	**Total Carrying Amount**	**Total Fair Value**
Assets - Maturities represent expected principal receipts, fair values represent assets.								
Fixed-rate notes receivable	$ 5	$ 3	$ 3	$ 1	$ 1	$ 31	$ 44	$ 44
Average interest rate							1.27%	
Floating-rate notes receivable	$ 4	$ 29	$ 25	$ 1	$ 7	$ 16	$ 82	$ 77
Average interest rate							4.36%	
Liabilities - Maturities represent expected principal payments, fair values represent liabilities.								
Fixed-rate debt	$ (422)	$ (859)	$(1,107)	$ (686)	$ (14)	$(2,543)	$ (5,631)	$(5,880)
Average interest rate							3.44%	
Floating-rate debt	$ (549)	$ (299)	$ (543)	—	$(3,761)	—	$ (5,152)	$(5,179)
Average interest rate							2.30%	

($ in millions)	**<1 Year**	**1-3 Years**	**3-5 Years**	**After 5 Years**	**Total**
Debt	$ 1,228	$ 3,188	$ 4,704	$ 2,857	$11,977
Finance lease obligations	13	26	27	151	217
Operating leases with MAR as the primary obligor	173	336	222	579	1,310
Purchase obligations	116	160	—	—	276
Other noncurrent liabilities	—	53	16	59	128
Total contractual obligations	**$ 1,530**	**$ 3,763**	**$ 4,969**	**$ 3,646**	**$13,908**

Exhibit 13. Interest Coverage Ratios and Credit Ratings for Firms with High Market Capitalization

Interest Coverage Ratio	Rating	Spread
> 8.5	AAA	0.75%
6.5-8.5	AA	1.00%
5.5 - 6.5	A+	1.50%
4.25- 5.5	A	1.80%
3- 4.25	A-	2.00%
2.5-3	BBB	2.25%
2- 2.5	BB	3.50%
1.75-2	B+	4.75%
1.5-1.75	B	6.50%
1.25-1.5	B-	8.00%
0.8-1.25	CCC	10.00%
0.65-0.8	CC	11.50%
0.2-0.65	C	12.70%
<0.2	D	14.00%

Source: Damodaran.

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THE WEWORK COMPANY: A CASE ABOUT A FAILED IPO, UNICORN STARTUP

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The case explores the activities and ethical dilemmas of The WeWork Company and its key founder Adam Neumann. It examines documents relevant to its failed initial public offering and appraises the ensuing liquidity crisis and pending legal actions taken by employees, shareholders and Adam Neumann himself. Students study the Registration Statement S-1 and consider the use of non-GAAP measures in the WeWork initial public offering, related-party transactions and disclosures, the "controlled corporation" status and its impact on corporate governance requirements, and executive behaviors and professional attitudes as a backdrop for examining the CFA Institute, Code of Ethics and Standards of Professional Conduct document.

INTRODUCTION

The WeWork Company was one of the fastest growing start-up companies in recent history. Since its inception in 2010, the company has raised over $13.80 billion dollars of capital and achieved sales growth in excess of 250% over the four-year period 2016 – 2019 ("WeWork Stock Price, Funding Rounds," 2020). Losses over the same period topped four billion dollars. In desperate need of cash, the company released its initial public offering in late summer of 2019. Following an unexpected turn of events, the IPO was withdrawn shortly after its release and the company's founder and CEO, Adam Neumann was forced to resign.

Maintaining triple digit sales growth and incurring triple digit losses was considered a high risk, high reward gamble, but investors found the company's future prospects attractive. The list of investors included names like JP Morgan, Chase & Co., T. Rowe Price Associates, Wellington Management, Goldman Sachs Group, The Harvard Management Company, Benchmark, and Fidelity Investments ("WeWork Stock Price, Funding Rounds," 2020). WeWork's biggest backer was Softbank, a Japanese multinational conglomerate that primarily focuses on startup companies in the technology, energy and financial sectors. Following WeWork's failed IPO, Softbank agreed to up its stake in the company to over 80%, initiating an agreement to resolve the immediate liquidity crisis and to derive the terms of the company's severance package and tender offer to buy out the equity position of the company's initial founder, Adam Neumann (Farrell and Eliot, 2019). In the fall of 2019, Softbank worked a deal to pay Neumann over $1.7 billion in a severance agreement (Telford, 2019), while simultaneously laying off about 2,400 employees - about 20% of its workforce (Dang et al, 2019). Additional layoffs have occurred since then due to challenges presented by the coronavirus and the related economic downturn. Softbank has since reneged on the original deal, claiming failure of the counterparty to fulfill the contract (Nussey and Singh, 2020). Neumann and other top executives have filed a lawsuit against WeWork for breach of contract (Iyengar, 2020).

The Company

WeWork Company is a commercial real estate firm that provides shared workspaces. It is a subsidiary company of The We Company. WeWork provides office space for budding entrepreneurs and start-up firms who need less costly office space than they can acquire on their own. WeWork's mission and vision is very inspiring: "A place where we're redefining success measured by personal fulfillment, not just the bottom line. Community is our catalyst," ("WeWork, About Us, Our Story," 2020)

Among the leaders that touted the company's mission, Adam Neumann seemed to stand above the rest – and truly believed in the potential of that mission:

> "The We Company's guiding mission will be to elevate the world's consciousness. Living a conscious life means choosing to live proactively and with purpose. It means being a student of life, for life, where we accept that we are always growing and in a constant state of self-discovery, self-growth, and change. The idea that began in New York nine years ago was always about more than work—it was about supporting all aspects of life. As we've built WeWork, our community taught us that we are more alike than we are different. It taught us that we all thrive when we have a purpose. And it taught us that experiences bring more fulfillment and joy than material goods." (Neumann, 2019)

One of the most exciting aspects of the WeWork Company was its rock-star like status as a unicorn start-up (privately held startup company). Initially, the company's primary business of developing co-working spaces seemed like a slam-dunk. Like most start-up firms, WeWork had yet to turn an official GAAP profit. In fact, "official" GAAP losses over the last four years were over $4 billion. In 2016 GAAP losses amounted to $429.7 million on $436 million in revenue; in 2017 losses were $933.5 million on $886 million in revenue; 2018 showed $1.9 billion in losses on $1.6 billion in revenue; for the first six months alone of 2019, losses amounted to $900 million on $1.5 billion in revenue ("WeWork Stock Price, Funding Rounds," 2020). Although WeWork had raised $13.8 billion dollars since its inception, the firm's $47 billion valuation in January of 2019 was revised to $9.5 billion in September of 2019, $5 billion in November of 2019, and more recently $2.9 billion in May of 2020 (Feiner, 2020). Clearly the coronavirus was having a significant impact on the earnings potential and future value of the open-office space enterprise. With $6.3 billion in total liabilities, the company's net worth was potentially negative.

One of the original co-founders and, until Fall of 2019, CEO and chairman of the board, the charismatic Neumann was the unquestioned philosophical leader of the firm. WeWork was the fastest growing startup in history, and Neumann was the epicenter of that growth. Following the failed IPO, however, investors and other interested parties were re-evaluating their initial perceptions of Neumann and his "We" philosophy. There was enough public outrage to trigger an investigation. The New York Attorney General is investigating whether WeWork founder Adam Neumann, was engaged in "self-dealing" to enrich himself at the expense of the company, employees and shareholders (Roumeliotis et al., 2019).

Initially, investors were not overly concerned about the year-over-year losses. Disrupting an entire industry required a company to focus on things other than just short-term profits. After all, losing money was almost a sign of credibility among disrupters as major players like Amazon, Uber, Tesla, SnapChat, Lyft, Peloton, and others took years before making money (if they ever had). Investors initial confidence had probably been reaffirmed when Neumann and other executives publicly touted that the company already had a profitable metric Neumann called Community Adjusted EBITDA (earnings before interest, taxes, depreciation and amortization). After battling its it out with the SEC, WeWork included this measure in its prospectus, but revised it, renaming it "contribution margin" (Eaglesham and Eliot, 2019).

It seems like the SEC and potential IPO investors both had problems with the Community Adjusted EBITDA number (aka contribution margin) that had inspired such confidence in the company. Suddenly, GAAP Profits were more important than this number – and many questioned whether this measure was even valid. The controversy planted seeds of doubt about the company and its ability to survive without the money (capital) from the IPO. There were growing concerns about the company's long-term sustainability. All start-ups have challenges, but following the withdrawal of the IPO, the company was having real cash flow problems. Additionally, it was reeling from layoffs and rumors of scandalous executive behavior. Then the coronavirus struck.

Non-GAAP measures

On pages 70-77 in the Registration Statement S-1, the company explains the computation of the contribution margin calculation and justifies its use as relevant in evaluating the performance of the business. Here's the link to the S-1 statement:
https://www.sec.gov/Archives/edgar/data/1533523/000119312519220499/d781982ds1.htm#toc781982_10

An excerpt from the filing, page 71 is recreated below:

Table 1: Contribution Margin, WeWork, Registration S-1, page 71

(Amounts in thousands)	Year Ended December 31,			Six Months Ended June 30,	
	2016	2017	2018	2018	2019
Membership and service revenue (e)	$434,355	$866,898	$1,697,336	$713,956	$1,348,772
Less: Location operating expenses (b)	(433,167)	(814,782)	(1,521,129)	(635,968)	(1,232,941)
Add: Stock-based compensation expense (c)	2,032	18,718	22,793	6,420	25,953
Contribution margin including non-cash GAAP straight-line lease cost	***3,220***	***70,834***	***199,000***	***84,408***	***141,784***
Add: non-cash GAAP straight-line lease cost (as included in location operating expenses)	92,723	162,313	268,125	117,178	198,124
Contribution margin excluding non-cash GAAP straight-line lease cost	***$95,943***	***$233,147***	***$467,125***	***$201,586***	***$339,908***
End of excerpt					
GAAP Loss from Operations	*$(396,274)*	*$(931,834)*	*$(1,690,999)*	*$(677,859)*	*$(1,369,450)*

The largest adjustment is the non-cash GAAP straight-line lease cost which WeWork explains as the impact of "free rent" periods and "lease cost escalation clauses." Often times, start-up companies provide additional Non-GAAP information on earnings, attempting to provide relevant information to investors to aid in the projections of future earnings potential and cash flow. A positive Non-GAAP earnings amount may indicate that a company has a viable business model that has yet to reach scale.

Related Party Transactions

Several related party transactions are listed on pages 197 – 207 of the Registration Statement S-1 (also discussed on page 28, Risk Factors section and on page F-61 of the notes to the financial statements). Related party transactions are transactions that are made between entities with a close relationship such as an employment arrangement. In the WeWork's case, there are several related party transactions. Examples include issues related to voting rights, succession planning, employment agreements, equity awards, charitable contributions, real estate transactions, loans, family relationships, and other matters. Neumann's ownership high-vote shares had 20 votes per share, twice as many votes as many of his peers on the board giving him a majority position to control the outcome of all matters brought before the board.

Rebekah Neumann, wife to Adam Neumann, is the founder and CEO of WeGrow, a "conscious entrepreneurial school" under the We Company umbrella. She and two other members of the board were in charge of succession planning for the firm. There are several tangled-up real estate transactions that involve Neumann as landlord and WeWork as lessee. Many of these contracts are in the millions of dollars. In addition, WeWork has made low interest rate loans to Neumann with very generous repayment terms. Neumann was also the recipient of a transaction that involved the payment of $5.9 million dollars by We Company for the copyright privileges associated with the "We" name (Gilbert, 2019).

In a highly unusual move, WeWork announced it was filing an amended S-1 shortly after the IPOs initial release. In the amended S-1, WeWork would make several corporate governance changes including a revision of votes granted to high-vote shares from 20 to 10, removal of Rebekah Neumann as the lead in choosing a successor, and prompted the return of profits (by Neumann) for real estate transactions (Palmer, 2019), and the $5.9 million for the 'We' name copyright (Gilbert, 2019).

Controlled Company Designation

A controlled company is any company in which more than 50% of the voting power is held by a single person. A company classified as a controlled company may rely on the "controlled company exemption" to avoid certain corporate governance listing standards. An example exemption relates to the board member independence criteria which means that a controlled company can avoid the requirement that a majority of the directors are classified as independent. On page 46 of the Registration Statement, WeWork discloses that it was classified as a controlled corporation and as such the independence criteria was not required in selecting the board of directors. As part of the exemption, a controlled company was required to disclose that they rely on the controlled company exemption, the basis for the exemption and the corporate governance standards with which the company did not comply. On page 46 of the Registration Statement S-1, WeWork states that they "may take advantage of exemptions under the rules with respect to certain corporate governance requirements" and they specifically list the compensation committee, and the nominating and corporate governance committee as areas in which the committee members may not be entirely composed of independent directors.

Mission Issues, SEC violations and Pending Lawsuits

Often, WeWork employees complained about cut-throat, back-stabbing behavior and poor managerial decision-making that put growth before everything else and ignored the company's purported values (Campbell, 2019). Recent decisions to rent available space to more mature companies were viewed as questionable diversions from the company's stated purpose and values. Lawsuits by employees indicate issues related to practices of discrimination and other types of financial and employment contract violations (Morris, 2020).

WeWork may have violated the SEC quiet period rules which apply to Registration Statement S-1 filings. These rules prohibit the WeWork executive team from discussing the IPO during the period of time between the filing with the SEC and its approval for public release. Information related to this issue is disclosed on the Registration Statement, S-1, page 49, Risk Factors.

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TO PAY POINTS OR NOT IN MORTGAGE FINANCE: A CAPITAL BUDGETING ANALYSIS

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Despite the current era of historic low mortgage interest rates, paying points to lower the rate further in mortgage finance (refinance) has reemerged as a major choice option for home buyers (owners). This decision-making process parallels a typical problem in capital-budgeting analysis known as the mutually exclusive decision. We first use the mutually-exclusive binary decision to either finance without point payment or 1%-point payment to conduct a capital-budgeting base-case analysis using the various traditional capital-budgeting techniques. We next delve deeper into the decision-making process by conducting a sensitivity analysis on pairs of variables that have policy implications.

INTRODUCTION

Paying points to lower mortgage interest rate has been in existence for decades. To pay one point means the home buyer or owner pays 1% of the loan value to the lender on the closing day (presumably from her cash reserve) in exchange for a lower interest rate. Since interest rates are typically quoted in eighths of a percent, historical data seem to suggest one point paid would lower the rate by 1/8 of 1% or 12.5 basis points. Surveys of today's points paid and interest rate decrease show only a positive relation between them, and more negotiable room between lenders and borrowers on the points paid (including fractional points) and rate reduction. For simplicity of conducting the base-case analyses, we assume 1 point paid will lower the rate by .125%.

Internal Revenue Code, section 461(g) 2 allows full deduction of mortgage-points payment as prepaid interest in the year of purchase if the property is the borrower-buyer's principal residence. For refinancing, Internal Revenue Code requires mortgage-points payment to be amortized. Our analysis in the base-case exercise assumes purchase by the prospective homeowner, not refinancing by the existing homeowner.

For the base-case, we assume a loan amount of $½million for a traditional 30-year fixed rate mortgage at a 3.00% per annum or .25% per month. We further assume the buyer-borrower decides to pay one point from her cash reserve which amounts to $5,000 pre-tax, her case reserve earns her 1.2% per annum return, and her marginal tax rate is 20%. The one-point payment results in her fixed rate to decrease from 3.000% to 2.875% per annum.

THE ANALYSIS

We first perform a base-case analysis using the data provided or assumed so far.

Q1: Calculate and determine the monthly cash flows for the no-point 30-year mortgage. Don't forget the initial cash flow, CF_0, and use the silent + for cash inflow and explicit – for cash outflow.

Q2: Calculate and determine the monthly cash flows for the 1-point 30-year mortgage. Again, remember CF_0, and use silent + for cash inflow and explicit – for cash outflow.

Q3: From the monthly cash flows in the previous two questions, derive the *incremental* cash flows of paying for the 1-point upfront relative to the no-point. (Hint: initial cash flow, CF_0, equals – .5m * .01 * (1 – .20) – 0 = –4k. The initial negative sign signifies cash outflow.) Your onus is to figure out CF_1 through CF_{360}. Again, use silent + for cash inflow and explicit – for cash outflow.

Q4: From the incremental cash flows established in Q3 above, find the following capital-budgeting measures. Since her cash reserve earns 1.2% per year, it is therefore reasonable to use the same rate to discount all future cash flows.

i. undiscounted payback in years;
ii. discounted payback in years;
iii. net present value, NPV, in $;
iv. internal rate of return, IRR, in %;
v. profitability index, and;
vi. modified internal rate of return, MIRR, in %. Use reinvestment rate of 1.2% per annum or .1% per month.

Next, we perform 2-variable sensitivity analyses over ranges of plausible values of three variables by calculating the discounted payback period which is simply the number of years a house buyer needs to stay in the purchased residence to breakeven the extra upfront point-payment cash outflow incurred to earn the lower interest rate. The three variables are the buyer's marginal tax rate, her opportunity cost of her cash reserve account and the points she decides pay to reduce the interest rate. In this analysis, beware of the #NUM! output generated by the time-value-of-money functions in Excel's **Data**, **What-if Analysis**, **Data Table** mode. They are not spurious output but do have their own significant financial interpretation. Those students who need help with the **Data Table** function in Excel, please refer to the Appendix where a similar numerical example is presented as a learning illustration.

MODELING

Let's set up the general formula for solving the breakeven number of months as follows:

$$\left(\frac{M}{PVIFA_{(x/12)\%,360}} - \frac{M}{PVIFA_{(y/12)\%,360}}\right) * PVIFA_{(z/12)\%,T} = \left(\frac{p}{100}\right) * M * (1-t) \quad \text{……..(1)}$$

where:
M = original principal amount of the mortgage in $
x = percent interest without points
y = percent interest with p points
z = opportunity cost the homebuyer has to forgo to pay for the point(s)
p = number of point(s) in percent
t = marginal tax rate which the homebuyer faces
T = number of months for the homebuyer to breakeven the p-point payment upfront

The first (second) term within the left-hand-side parentheses in Eqn. (1) is the monthly payment without (with) point. The difference of the two terms within the parentheses is the monthly saving the homebuyer realizes by paying points upfront. The PVIFA is simply the discounting factor for the monthly saving using the homebuyer's opportunity cost of capital she faces, e.g., the rate she earns in her cash reserve account. The right-hand-side term is the upfront after-tax payment for the homebuyer who faces t marginal tax rate.

Algebraically, it is obvious that the solution for T, the breakeven number of months is independent of the mortgage amount M since M can be factored out on both sides, and then be cancelled out. Moreover, if we assume one paid mortgage point, p=1, will incur an eighth of percent point or 12.5 basis points reduction, the array of outcomes we obtain further depends on the three variables, namely the level of opportunity costs z, the point payment p, and the marginal tax rate the homebuyer faces t.

For readers who are well-versed in capital-budgeting techniques, it should not be too hard to recognize that the solution for T is indeed the *discounted payback period*, dPB, that so many corporate finance textbooks discuss *ad nauseam* although it manifests in this context in a masqueraded manner. The number of months needed to breakeven the point payment is simply the discounted payback period, expressed in months, the homebuyer needs to wait in recouping her lump sum point payment by discounting all future monthly savings at the opportunity cost she faces at z% opportunity cost per annum.

With the above general framework, we now proceed to estimate the arrays of triad combinations for practically meaningful domains on (points paid, opportunity cost of capital for points, marginal tax rate), or (p, z, t) using the notations listed in the above equation.

To facilitate the computation of the numerous triad combinations of result, we use the Microsoft Excel's Data Table function. We re-arrange Eqn. (1) above into Eqn. (2) below.

$$PVIFA_{\left(\frac{z}{12}\right)\%,T} = \frac{\left(\frac{p}{100}\right)*(1-t)}{\left[\left(\frac{1}{PVIFA_{\left(\frac{x}{12}\right)\%,360}}\right)-\left(\frac{1}{PVIFA_{\left(\frac{y}{12}\right)\%,360}}\right)\right]} \equiv \frac{numerator}{denominator} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

To generate the numerous triad combinations of results, we code Equation (2) above in Excel as follows:

Table 1: Microsoft Excel codes used to generate the number of years needed to breakeven the points paid p, at the opportunity cost of borrower z and the marginal tax rate t for a 30-year fixed rate mortgage at 3% p.a.

	A	B	C	D	E	F	G	H
1	p	1			Point's opportunity cost, z			
2	x	0.03		=B11	0.005	0.01	0.012	0.015
3	y	=B2-0.125*B1/100	Marginal tax rate, t	0.1				
4	z	0.012		0.2				
5	t	0.2		0.3				
6	numerator	=B1*(1-B5)/100		0.4				
7	PVIFA_x%	=1/PMT(B2/12,360,-1,0,0)						
8	PVIFA_y%	=1/PMT(B3/12,360,-1,0,0)						
9	denominator	=(1/B7 - 1/B8)						
10	PVIFA_T	=B6/B9						
11	breakeven T	=NPER(B4/12,-1,B10,0,0)/12						

We assume 1 point paid will reduce the interest rate by 12.5 basis points as in cell B3. Of course, this assumption in cell B3 can be voided by entering its content manually without assuming the "1 point buys 12.5-basis-point" relation to reflect the exact interest rate the homebuyer faces by paying p points in cell B1.

To generate the table in cells D2 through H6, we enter "=B11" in Cell D2. We next enter practical range of opportunity costs for the points paid in cells E2 through H2, and marginal tax rates range in cells D3 through D6. Considering today's low interest rate environment for depositors, we use .5% through 1.5% as the borrower's opportunity costs for the points paid, and we use 10% through 40% marginal tax rates. Then, we select cells D2 through H6, choose *Data*, followed by *What-if Analysis*, followed by *Data Table*. A small interactive window will pop up for us to enter *Row input cell* as B4, and *Column input cell* as B5. Click the *OK* icon in the bottom of the interactive window will enable Excel to generate the results in Cells E3 through H6.

In short, given an interest rate for the mortgage, in this case it is 3% p.a. input in Cell B2, we can obtain the triad combination of results by entering values in Cells B1, B4 and B5. The breakeven year will show in Cell B11. The table in Cells D2 through H6 will then show sensitivity-analysis results when opportunity cost of points is in the .5%-to-1.5% domain and the marginal tax rate is in the 10%-to-40% domain. We repeat the above exercise for 2-, 3-, 4-, and 5-point payments. Of course, we can change the numerical values in the z- and p-domain so that they are more indicative of the actual rates the home buyer-borrower faces.

THE RESULTS

Use the algorithm of the Excel program presented in Table 1 to generate Table 2 sensitivity analysis results.

Table 2: Number of years for a homebuyer to breakeven the point payment for a 3% per annum 30-year traditional fixed-rate mortgage.

We assume each paid point will reduce the annual mortgage rate by 1/8 of a percent point or 12.5 basis points from the original 3% per annum rate without any paid point. We estimate the arrays of results for .5%, 1%, 1.2% and 1.5% per annum opportunity cost of paid points, and for marginal tax rates of 10%, 20%, 30%, and 40% for the homebuyer.

Panel A:

Marginal tax rates, t%	Paid point, p=1, y=2.875% p.a.			
	z=.50%	z=1.00%	z=1.20%	z = 1.50%
10				
20				
30				
40				

Panel B:

Marginal tax rates, t%	Paid points, p=2, y=2.750% p.a.			
	z=.50%	z=1.00%	z=1.20%	z = 1.50%
10				
20				
30				
40				

Panel C:

Marginal tax rates, t%	Paid points, p=3, y=2.625% p.a.			
	z=.50%	z=1.00%	z=1.20%	z = 1.50%
10				
20				
30				
40				

Panel D:

Marginal tax rates, t%	Paid points, p=4, y=2.500% p.a.			
	z=.50%	z=1.00%	z=1.20%	z = 1.50%
10				
20				
30				
40				

Panel E:

Marginal tax rates, t%	Paid points, p=5, y=2.375% p.a.			
	z=.50%	z=1.00%	z=1.20%	z = 1.50%
10				
20				
30				
40				

Q5: From Table 2 on each of its five panels, make two *ceteris paribus* statements on the discounted payback, dPB, on each variable. Then, make another combined statement on discounted payback's trend based on both variables. That is:

Holding marginal tax rate constant, increasing opportunity cost results in _____ dPB. (Use *higher* or *lower* to fill in the blank.)

Holding opportunity cost constant, increasing marginal tax rate results in _____ dPB.

Since the lowest number of computed dPB in each panel occurs in the _____ (use *NW, NE, SW* or *SE* as answer) corner, we conclude that point payment favors a homebuyer who faces _____ opportunity cost of capital and _____ marginal tax rate. (Use *higher* or *lower* to fill in the blank here.)

Q6: From Table 2 across all of its five panels, make one *ceteris paribus* statements on the discounted payback on varying p while holding z and t constant.

Holding z and t constant, increasing p results in _____ dPB. (Use *higher* or *lower* for this blank)

Q7: Which homebuyer below is most likely to accept the point proposal given each of them faces different cost of capital and marginal tax rate? Justify your selected answer.

Homebuyer	Points paid, %	Opportunity cost, %	Marginal tax rate, %
A	1	1.2	20
B	2	.50	35
C	.5	1.5	40
D	3	6.0	37.5

Q8: Activate the **Solver** function (under the Data tab) in your Excel for this exercise. Suppose you need to buy a new house to stay for 8 more years in upstate New York before you retire to warmer city located between Virginia Beach and Miami, Florida when your Social Security benefits can be collected without penalty. Availability of savings deposits' options and your tax accountant both let you have some control over the z and t variables. Find the optimal triad combination that you can breakeven in the points paid for the mortgage. Express p to 4 decimal places, z and t to 2 decimal places in percent.

Q9: At (p, z, t) = (1, 1.2%, 20%) when mortgage rate was at 3.00%, we found the old dPB for our base-case. Now, change the (p, z, t) to (1, 2.4%, 20%) with mortgage rate at 6.00%, find the new dPB. Comparing the old and new dPBs, is point payment expected to be more popular in low- or high-interest-rate environment? Justify your answer.

Q10: The discussions hitherto all hinged on points paid by the borrower to the mortgage firm, or *positive* points. In the mortgage industry, however, *negative* points are also available. In a negative-point arrangement, the homebuyer receives a certain amount of cash which she can use for closing and other expenses in exchange for a higher mortgage rate. Reset all entry values to 3%

mortgage base rate, (p,z,t) to (1, 1.2%, 20%), identify three changes one needs to make to the Excel program in Table 1 to make its usable for negative points. Finally, use the modified program to find the dPB for a 1.00% point *received* with opportunity cost at 1.2%, marginal tax rate at 20%.

Given cell B1 remains at a value of 1, the three changes in other cells to make the Excel program in Table 1 to calculate negative points are:

Change 1 in cell _____ by _____

Change 2 in cell _____ by _____, and

Change 3 in cell _____ by _____.

The dPB with 3% mortgage base rate, -1% point *received*, 1.2% opportunity cost, and 20% marginal tax rate is ___ years _____ months _____ days.

Bonus question: To arrive at the exact same answer as in Q10 above, there's a more efficient way that allows us to reduce the 3 changes in Q10 by replacing them with only one change of the original base-case program. Identify the way, and the only change.

The way is _____.

The only change is _____.

APPENDIX

We illustrate the use of Excel's Data Table function to generate a 2-variable sensitivity analysis for a saver who plans to amass $1million by depositing $x monthly into an account that earns y% per year. We let x assume its range values of $250, $500, $750, and $1,000 per month in deposit. We let y take its range values of 3%, 6%, 9%, and 12% return earned per year.

	A	B	C	D	E	F	G	H
1	FV	1000000		40.065	0.03	0.06	0.09	0.12
2	Mthly deposit, x, in $	500		250	80.030	50.869	38.298	31.101
3	Ann int rate, y, in %	0.06		500	59.800	40.065	30.922	25.498
4	Years needed for $1m	40.065		750	48.939	34.033	26.743	22.299
5				1000	41.811	29.937	23.868	20.082

Entries in the Excel spreadsheet are:

All contents in column A, cells B1 through B3, E1 through H1, and D2 through D5 are manually input. In cell B4, enter **=nper(B3/12,-B2,0,B1,0)/12**. In cell D1, enter **=B4**. Next, we **select cells D1 through H5** which are now highlighted. Next, we click the "**Data**" tab on top row of the spreadsheet, followed by "**What-if Analysis**," and "**Data Table**" sequentially. This will cause a window to pop up where we will enter **B3** for "Row input cell," and **B2** for "Column input cell." Clicking the **Ok** icon in the pop-up window will yield all the outputs in cells E2 through H5. These are the results for the number of years the saver needs to amass $1m at the corresponding interest rate and monthly deposit. For example, at 6% per year, and 500 $/month deposit, the saver needs 40.065 years to amass $1m. Using the Texas Instruments BA II Plus Professional financial calculator for verification, we'll enter I/Y = 6÷12 = 0.5; PMT = –500; FV = 1,000,000; CPT N = 480.777 months = 40.065 years which is exactly the answer in cells B4, D1 and F3.

TEACHER RETIREMENT OPTIONS AND FACTORS: EXAMPLES FROM TEXAS

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Defined benefit plans are used as a retirement option for public school teachers across the fifty states. A present value analysis is presented on the various options available to public school teachers in the state of Texas. Our analysis demonstrates that two of the six options available to public school teachers in Texas result in the largest present values in most scenarios examined. Those options are the Standard Annuity option and the Joint and Survivor Annuity Option. Extended to other retirement systems, this example can be used to help public school teachers better understand their retirement options and make better choices.

INTRODUCTION

At the start of the twenty-first century all fifty states offered their school teachers (PreK – 12) defined benefit retirement plans. By 2010 a few states moved to offer defined contribution plans in an effort to reduce the cost of retirements for the state and shift more of the risk of funding retirement to the teacher. Many states that did not shift to defined contribution plans did create "tiers" for more recent hires, that change (i.e., reduce) the attractiveness of the defined benefit plans by either increasing retirement age minimums, increasing the minimum number of years worked, lengthening the final highest pay averaging periods, or using some combination of these three.

Each state has different defined benefit retirement rules. However, the differences are typically minor rather than major. Thus, although the purpose of this article is to provide a helpful guide to State of Texas public school teachers in examining the options and factors that are likely to impact or influence their "defined benefit" retirement choice, this guide should be of benefit to some teachers in all states. Retirement requirements and options are examined using the Teacher Retirement System of Texas (TRS, 2018, pgs. 1 – 80).

Retirement Requirements

There are numerous rules about minimum service credit, the ability to purchase service credit (say for prior work experience or military service), tiers, and other issues. We will use the age and service requirements for a Tier 1 teacher in the state of Texas. There are five other tiers and the factors that influence the "defined benefit" retirement choice will differ for those teachers.

"Teachers who became a member of TRS prior to September 1, 2007 and maintain their membership until retirement can meet the age and service requirement for normal-age service retirement when they are age 65 with five or more years of service credit or when their age and

years of service credit total 80 and they have at least five years of service credit**."** (TRS, 2018, pg. 35)

We will examine two situations that we hope are common. The first situation concerns a younger teacher who desires to retire at age 55 with 25 years of eligible service. To provide a contrast, the second situation concerns an older teacher who retires at age 65 with 35 years of eligible service. Using these two situations should illustrate a nice range of retirement incomes. Teachers who become administrators will likely have higher income levels, but that can be the subject for a different study.

Retirement Options

Teachers have six options from which to select their retirement benefit. For comparison with the other plans, the *Standard Annuity* benefit calculation multiplies the "average salary" times the total years of Service Credit times 2.3% (TRS, 2018, p. 36). The "average salary" is the average of the teacher's three highest annual salaries (TRS, 2018, p. 36). For newer "tiers" of teachers, "average salary" is the average of the teacher's five highest annual salaries (TRS, 2018, pp 38, 40, 42, 44, 46). Again, we will assume our two teachers meet the "Average of Three Highest Annual Salaries" criterion (TRS, 2018, p. 36). The standard annuity benefit amount would be "average salary" X 25 X 2.3% or 57.5% of the "average salary" for the younger teacher and 92% for the older teacher. We assume the "average salary" for the young teacher is $60,000 and $90,000 for the old teacher. Therefore, the standard annuity for the young teacher will be $5,000 per month and for the older teacher will be $7,500. The other five retirement options in addition to the standard annuity are described below:

1. Joint and Survivor Annuity. This is a reduced annuity that is paid to the teacher and then to a surviving beneficiary for life. The amount of this annuity is reduced based on an actuarial factor to account for joint life expectancy. This will be referred to as Option 1.
2. Joint Monthly Annuity with the Spouse to receive 50% of the monthly annuity after the teacher's death. This will be referred to as Option 2.
3. Monthly Annuity Guaranteed for 60 months. This annuity is guaranteed to last at least 60 months, but will last as long as the teacher lives. This will be referred to as Option 3.
4. Monthly Annuity Guaranteed for 120 months. This annuity is guaranteed to last at least 120 months, but it will last as long as the teacher lives. This will be referred to as Option 4.
5. Joint Monthly Annuity with the Spouse to receive 75% of the monthly annuity after the teacher's death. This will be referred to as Option 5.

Teachers with "other" average salaries, can divide their "average salaries" by one of these number to get an estimate of their retirement incomes under the various options. Of course, their estimates would have to be adjusted for their unique circumstances **(**different career lengths, different retirement ages, and differences in ages between teacher and beneficiary**)**.

Factors Likely to Influence the Retiree's Decision

Marital Status, health, and expected life span each have a major impact on the retirement option choice made. For a single teacher, a joint annuity would not be an option. For a single teacher the three choices will likely be the Standard Annuity, Option 3 and Option 4. Teachers in

good health will likely select the Standard Annuity because it will be the larger in monthly amount than either Option 3 or Option 4 and the teacher is likely to live longer than 60 or 120 months. Teachers in poor health would be more likely to select Option 3 or Option 4 and actuarial factors based on the age of the retiring teacher will impact these numbers. Actuarial discounts are smaller for Option 3 than they are for Option 4 and increase for both Options as the age of the retiree increase. Discounts for Options 3 and 4 are much smaller than discounts for Options 1, 2 and 5.

For married teachers, all 5 options become relevant. Health and expected life span for both the teacher and the teacher's beneficiary assume increased importance. If they are both in good health and have a long life expectancy, Options 1, 2 and 5 become important. If they are both in poor health, Options 3 and 4 become important.

Life Expectancy Assumptions

We use the *Social Security Actuarial Life Table for 2013* for both our 55-year old teacher and our 65-year old teacher (Social Security Administration, 2013). The life expectancies of our 55-year old and 65-year old teachers depend on their sex.

	Life Expectancies (years/months)	
Age	**Male**	**Female**
55	25.47/306	28.83/346
65	17.84/214	20.44/245

To provide a variety of outcomes, we assume that actual life expectancies may range from 50% of the expected life expectancy to 150% of the expected life expectancy. Thus, for a young male teacher this would be 153 months for a short-life expectancy to 459 months for a long-life expectancy and for a young female teacher this would be 173 months for a short-life expectancy to 519 months for a long-life expectancy. For the older male teacher this would be 107 months for a short-life expectancy and 321 months for a long-life expectancy and for the older female teacher this would be 123 months for a short-life expectancy and 368 months for a long-life expectancy. Below is a summary of our life expectancy assumptions.

	Short Life Expectancy		**Average Life Expectancy**		**Long Life Expectancy**	
Age	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
55	153	173	306	346	459	519
65	107	123	214	245	321	368

ACTUARIAL DISCOUNTS AND METHODOLOGY

Actuarial discounts apply to each option and the options vary only based on the difference between the ages of the retiree and the retiree's beneficiary. For Texas, actuarial discounts do not vary based on sex. For a given retiree age, discounts increase as the difference between retiree and beneficiary age increases. Actuarial discounts decrease as the age of the retiree increases except for options 3 and 4. For these options actuarial discounts increase and age of retiree increases.

The TRS Handbook lists the percent of the standard annuity available to the retiree under each option (TRS, 2018, pgs. 51 and 52). Subtracting these figures from "1" would yield the actuarial discounts (not shown). Below is a summary of those percentages for each option.

	Young Teacher	Old Teacher
Option 1	92.56	86.94
Option 2	96.13	91.70
Option 3	99.76	98.99
Option 4	99.04	96.42
Option 5	94.31	88.05

We use a present value (PV) analysis to evaluate the various options and a discount rate of 3% per year. This discount rate is widely used in financial studies and is appropriate here because there is very little risk that monthly payments would be decreased or discontinued.

We examine 36 different 'Retiree, Beneficiary' life expectancy combinations. Table 1 breaks down the various scenarios being considered for the younger female/younger male and younger male/younger female retiree/beneficiary combinations. Table 2 breaks down the various scenarios being considered for the older female/older male and older male/older female retiree/beneficiary combinations. For reference, again remember the assumption is that the younger retiree retires at age 55 while the older retiree retires at age 65. Also, three different life expectancies are considered here: short, average and long.

DISCUSSION OF RESULTS

The present value analysis for the 36 different scenarios using the standard annuity option, option 1, option 2, option 3, option 4, and option 5 is shown in Tables 4 and 5. Table 4 shows the PV analysis for the younger teacher retiree/younger beneficiary scenarios while Table 5 shows the PV analysis for the older teacher retiree/older beneficiary scenarios. However, before discussing the results, it would be beneficial to go through a specific example of one of the scenarios we considered in our analysis. Specifically, we are going to describe the present value analysis calculations for Scenario 2 where there is a younger female retiree with a life expectancy of 173 months and the younger male beneficiary with a life expectancy of 306 months. The complete explanation for the present value analysis for Scenario 2 is given in Table 3.

For the ages used in this study, the Standard Annuity is often the best option (Scenarios 1, 4, 5, 7, 8, 9, 13, 16, 17, 18, 19, 22, 23, 25, 26, 27, 31, 32, 34, 35, and 36). In these cases, the life expectancies of both the teacher and beneficiary are similar or the life expectancy of the teacher exceeds the life expectancy of the beneficiary. So, The Standard Annuity is the best option in 21 of the 36 scenarios studied.

Option 1, the Joint and Survivor Annuity, is the second most common "best option" in 14 of the scenarios studied (scenario 2, 3, 6, 10, 11, 12, 14, 15, 20, 21, 24, 29, 30, and 33). These fourteen cases have a common characteristic in that the beneficiary has a longer life expectancy that the retiree. The advantage to selecting Option 1 increases as the beneficiary's life expectancy becomes greater than the life expectancy of the retiree. Poor health of the retiree would be another factor suggesting the selection of this option.

Option 4 was the best option in only one instance (Scenario 28). Option 4 (Monthly Annuity Guaranteed for 120 months) becomes a viable option when the life expectancies of both

teacher and beneficiary are short. Thus, Option 4 becomes a viable option for teachers and beneficiaries older than those covered in the TRS Benefits Handbook. Option 4 becomes a viable option in situations in which the teacher and beneficiary both have a short life expectancy due to old age or poor health. Option 4 also allows for the possibility of having some benefits go to a secondary beneficiary or beneficiaries.

The Standard Annuity and the Joint and Survivor Annuity are selected in 35 of the 36 cases examined. The Joint and Survivor Annuity is selected. only if two conditions are met. First the Beneficiary must have a life expectancy that is about 13% longer than the life expectancy of the teacher. Second, this rule does not apply if the 13% difference occurs for into the future because the present values far into the future are very small.

In a pairwise comparison between Options 3 and 4, the Monthly Annuity Guaranteed for 60 months (Option 3) is almost always preferred to the Monthly Annuity Guaranteed for 120 months (Option 4). This general rule is violated in only three cases (Cases 28, 29, and 30) when the teacher has a very short life expectancy (107 months) and the beneficiary has a life expectancy that is 15% or larger than the life expectancy of the teacher. Notice, that if the beneficiary is expected to outlive the teacher by a significant length of time (Cases 29 and 30), that while Option 4 might be better than Option 3, it is not the best option to select compared to Option 1, the Joint and Survivor Annuity.

Table 6 shows each of the scenarios as wealth relatives with the standard annuity having a value of 1.0. Again, an example of the calculation will be helpful to explain this table. Using Scenario 2 again, we calculate the wealth relative for Options 1 through 5. The wealth relative is simply the ratio of the PV of the option being considered/PV of the standard annuity option.

Option	**Calculation**	**Wealth Relative**
Option 1	988,951/701,530	1.4097
Option 2	850,737/701,530	1.2127
Option 3	699,846/701,530	0.9976
Option 4	694,795/701,530	0.9904
Option 5	921,140/701,530	1.3130

If the wealth relative for a particular option is greater than one, then the digits to the right of the decimal point can be converted into percent to show how much better off (in percentage terms) the retire/beneficiary pair would be.

CONCLUSION

A present value analysis of teacher retirement options was conducted using data drawn from the Teacher Retirement System Benefits Handbook for the State of Texas and the Actuarial Life Tables used by the Social Security Administration. We assumed the teacher was married and the Benefits Handbook provides data for teachers and their beneficiaries between the ages of 55 and 65. To obtain a range of outcomes, we used both a young teacher (age 55) and an old teacher (65) and assumed that the teacher and beneficiary were both the same age.

Besides the Standard Annuity, five other options are available to a retiring teacher. Each option has a “Percent of Standard Annuity” factor that decreases as the age of the retiree increases. But, for a given age for the retiree, the “Percent of Standard Annuity” factor increases as the age

of the beneficiary increases. Furthermore, for the two options that are for a guaranteed period, the "Percent of Standard Annuity" is solely a function of the age of the retiring teacher.

Age and life expectancy were found to be the major factors affecting the choice of retirement option. Given the ages used in this study, the Standard Annuity was found to be the best present value choice in situation in which the life expectancy of the retiree and beneficiary were similar. This was the situation in 21 of the 36 cases studied.

The Joint and Survivor Annuity was the best present value choice in 14 of the remaining 15 situations. The Joint and Survivor Annuity is the option of choice when the beneficiary is expected to outlive the retiree.

It is interesting to note that although a retiree has 6 options from which to select, two are best from a present value perspective in 35 out of the 36 situations examined. One option, a Guaranteed Monthly Annuity for 120 months was a viable option in only one situation – the case in which both retiree and beneficiary had short life expectancies. This annuity would be a viable option for older teachers with shorter life expectancies and/or teachers/beneficiaries in very poor health at retirement.

SUGGESTIONS FOR FUTURE RESEARCH

This research examined retirement options from one state. Every other state will have retirement factors that differ from those in Texas. In many cases these differences will be minor. The percent of annual pay used to calculate benefits, the period over which "average pay" is calculated, and "the percent of standard annuity" will differ from State of Texas. Thus, it is quite possible that the best alternatives for other states will be different from the findings of this study. The authors hope that this study can serve as a guide to finance professionals throughout the U.S. for helping teachers understand and choose their best retirement plan.

REFERENCES

Social Security Administration. (2013). *Actuarial Life Table*. Retrieved from https://www.ssa.gov/oact/STATS/table4c6.html

Teachers Retirement System of Texas. (2018). *TRS Benefits Handbook*. Retrieved from https://www.trs.texas.gov/TRS%20Documents/benefits_handbook.pdf

Table 1. Younger Retiree/Younger Beneficiary Combinations

Scenario	Retiree	Life Expectancy	Beneficiary	Life Expectancy
1	Younger Female	173 Months	Younger Male	153 Months
2	Younger Female	173 Months	Younger Male	306 Months
3	Younger Female	173 Months	Younger Male	458 Months
4	Younger Female	346 Months	Younger Male	153 Months
5	Younger Female	346 Months	Younger Male	306 Months
6	Younger Female	346 Months	Younger Male	458 Months
7	Younger Female	519 Months	Younger Male	153 Months
8	Younger Female	519 Months	Younger Male	306 Months
9	Younger Female	519 Months	Younger Male	458 Months
10	Younger Male	153 Months	Younger Female	173 Months
11	Younger Male	153 Months	Younger Female	346 Months
12	Younger Male	153 Months	Younger Female	519 Months
13	Younger Male	306 Months	Younger Female	173 Months
14	Younger Male	306 Months	Younger Female	346 Months
15	Younger Male	306 Months	Younger Female	519 Months
16	Younger Male	458 Months	Younger Female	173 Months
17	Younger Male	458 Months	Younger Female	346 Months
18	Younger Male	458 Months	Younger Female	519 Months

Table 2. Older Retiree/Older Beneficiary Combinations

Scenario	Retiree	Life Expectancy	Beneficiary	Life Expectancy
19	Older Female	123 Months	Older Male	107 Months
20	Older Female	123 Months	Older Male	214 Months
21	Older Female	123 Months	Older Male	321 Months
22	Older Female	245 Months	Older Male	107 Months
23	Older Female	245 Months	Older Male	214 Months
24	Older Female	245 Months	Older Male	321 Months
25	Older Female	368 Months	Older Male	107 Months
26	Older Female	368 Months	Older Male	214 Months
27	Older Female	368 Months	Older Male	321 Months
28	Older Male	107 Months	Older Female	123 Months
29	Older Male	107 Months	Older Female	245 Months
30	Older Male	107 Months	Older Female	368 Months
31	Older Male	214 Months	Older Female	123 Months
32	Older Male	214 Months	Older Female	245 Months
33	Older Male	214 Months	Older Female	368 Months
34	Older Male	321 Months	Older Female	123 Months
35	Older Male	321 Months	Older Female	245 Months
36	Older Male	321 Months	Older Female	368 Months

Table 3. Present Value analysis for Scenario 2

Retirement Option	PV	Explanation
Standard Annuity	$701,530	Retiree receives $5000 monthly annuity for 173 months at a 3% discount rate. Calculate the PV of that annuity.
Option 1	$988,951	Retiree and then beneficiary (at the retiree's death) receives monthly annuity is $4628 due to actuarial discount (5000*0.9256). Calculate the PV of $4628 monthly annuity for 306 months at a 3% discount rate.
Option 2	$850,737	Retiree receives monthly annuity of $4806.50 due to actuarial discount of (5000*0.9613). PV of $4806.50 monthly annuity for 173 months at a 3% discount rate is $674,380.47; Since beneficiary outlives the retiree by 133 (306 – 173) months we need to calculate the present value of the benefits ($5,000)(0.9613)(.5) = $2,403.50 to the beneficiary. This value is $271,638. This value needs to be discounted back to the start of the joint annuity (173 months) and added to the value of the retiree's annuity. The present value of the beneficiary's annuity as of the start of the retiree's annuity is $176,357 and the present value of the retiree's annuity is $674,380. Adding these last two values we obtain the total value of $850,737.
Option 3	$699,846	Retiree receives monthly annuity is $4988 due to actuarial discount (5000*0.9976). Calculate the PV of $4988 monthly annuity for 173 months at a 3% discount rate.
Option 4	$694,795	Retiree receives monthly annuity is $4952 due to actuarial discount (5000*0.9904). Calculate the PV of $4952 monthly annuity for 173 months at a 3% discount rate.
Option 5	$912,140	Retiree receives monthly annuity of $4715.50 due to actuarial discount of (5000*0.9431). PV of $4715.50 monthly annuity for 173 months at a 3% discount rate is $661,612.63; Since beneficiary outlives the retiree by 133 (306 – 173) months we need to calculate the present value of the benefits ($5,000)(0.9431)(.75) = $3,536.63 to the beneficiary. This value is $399,743.46. This value needs to be discounted back to the start of the joint annuity (173 months) and added to the value of the retiree's annuity. The present value of the beneficiary's annuity as of the start of the retiree's annuity is $259,527.51 and the present value of the retiree's annuity is $661,612.63. Adding these last two values we obtain the total value of $921,140.

Table 4. Present Value analysis using a 3% discount rate for Younger Teacher Retiree/Younger Beneficiary scenarios

Created with actuarial discounts from the standard annuity amount of $5000 of 0.9256 for Option 1, 0.9613 for Option 2, 0.9976 for Option 3, 0.9904 for Option 4, and 0.9431 for Option 5.

Scenario	Standard Annuity	Option 1	Option 2	Option 3	Option 4	Option 5
Scenario 1	701,530	649,336	674,380	699,846	694,795	661,613
Scenario 2	701,530	988,951	850,737	699,846	694,795	921,140
Scenario 3	701,530	1,261,262	1,021,262	699,846	694,795	1,129,264
Scenario 4	1,156,987	1,070,908	1,112,154	1,154,211	1,145,880	1,091,155
Scenario 5	1,156,987	1,070,908	1,112,154	1,154,211	1,145,880	1,091,155
Scenario 6	1,156,987	1,261,262	1,211,002	1,154,211	1,145,880	1,236,620
Scenario 7	1,452,687	1,344,607	1,396,468	1,449,200	1,438,741	1,370,029
Scenario 8	1,452,687	1,344,607	1,396,468	1,449,200	1,438,741	1,370,029
Scenario 9	1,452,687	1,344,607	1,396,468	1,449,200	1,438,741	1,370,029
Scenario 10	635,041	649,336	642,423	633,517	628,944	645,936
Scenario 11	635,041	1,070,908	837,493	633,517	628,944	968,093
Scenario 12	635,041	1,344,607	878,680	633,517	628,944	1,177,248
Scenario 13	1,068,443	988,951	1,027,094	1,065,879	1,058,186	1,007,649
Scenario 14	1,068,443	1,070,908	1,109,780	1,065,879	1,058,186	1,070,278
Scenario 15	1,068,443	1,344,607	1,236,785	1,065,879	1,058,186	1,279,434
Scenario 16	793,305	689,699	727,460	785,292	764,904	698,505
Scenario 17	793,305	1,079,637	933,103	785,292	764,904	994,692
Scenario 18	793,305	1,438,015	1,122,103	785,292	764,904	1,266,908

Table 5. Present Value analysis using a 3% discount rate for the Older Teacher Retiree/Older Beneficiary scenarios

Created with actuarial discounts from the standard annuity amount of $5000 of 0.8694 for Option 1, 0.9170 for Option 2, 0.9899 for Option 3, 0.9642 for Option 4, and 0.8805 for Option 5.

Scenario	Standard Annuity	Option 1	Option 2	Option 3		Option 4	Option 5
Scenario 19	793,305	689,699	727,460	785,292		764,904	698,505
Scenario 20	793,305	1,079,637	933,103	785,292		764,904	994,692
Scenario 21	793,305	1,438,015	1,122,103	785,292		764,904	1,266,908
Scenario 22	1,372,774	1,193,490	1,258,834	1,358,909		1,323,629	1,208,728
Scenario 23	1,372,774	1,193,490	1,258,834	1,358,909		1,323,629	1,208,728
Scenario 24	1,372,774	1,438,015	1,387,791	1,358,909		1,323,629	1,394,463
Scenario 25	1,803,069	1,567,589	1,653,415	1,784,858		1,738,520	1,587,603
Scenario 26	1,803,069	1,567,589	1,653,415	1,784,858		1,738,520	1,587,603
Scenario 27	1,803,069	1,567,589	1,653,415	1,784,858		1,738,520	1,587,603
Scenario 28	703,362	689,699	686,221	696,259		748,907	619,311
Scenario 29	703,362	1,193,490	951,908	696,259		748,907	1,061,374
Scenario 30	703,362	1,567,589	1,149,198	696,259		748,907	1,345,530
Scenario 31	1,241,819	1,079,637	1,138,748	1,229,276		1,197,362	1,093,421
Scenario 32	1,241,819	1,193,490	1,198,791	1,229,276		1,197,362	1,179,901
Scenario 33	1,241,819	1,567,589	1,396,081	1,229,276		1,197,362	1,464,057
Scenario 34	1,654,032	1,438,015	1,516,747	1,637,326		1,594,817	1,456,375
Scenario 35	1,654,032	1,438,015	1,516,747	1,637,326		1,594,817	1,456,375
Scenario 36	1,654,032	1,567,589	1,585,081	1,637,326		1,594,817	1,554,796

Table 6. Wealth Relatives

Analysis using wealth relatives. Numbers greater than one have a present value greater than the Standard Annuity. Numbers less than one have a present value less than the Standard Annuity.

Scenario	Option 1	Option 2	Option 3	Option 4	Option 5	Best
Scenario 1	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 2	1.4097	1.2127	0.9976	0.9904	1.3130	Option 1
Scenario 3	1.8000	1.4153	0.9976	0.9904	1.6113	Option 1
Scenario 4	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 5	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 6	1.0914	1.0474	0.9976	0.9904	1.0698	Option 1
Scenario 7	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 8	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 9	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 10	1.0225	1.0116	0.9976	0.9904	1.0172	Option 1
Scenario 11	1.6864	1.3188	0.9976	0.9904	1.5258	Option 1
Scenario 12	2.1174	1.3837	0.9976	0.9904	1.8538	Option 1
Scenario 13	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 14	1.0023	1.0011	0.9976	0.9904	1.0017	Option 1
Scenario 15	1.2585	1.1342	0.9976	0.9904	1.1975	Option 1
Scenario 16	0.9267	0.9613	0.9976	0.9904	0.9442	Standard
Scenario 17	0.9256	0.9613	0.9976	0.9904	0.9431	Standard
Scenario 18	0.9856	0.9925	0.9976	0.9904	0.9890	Standard
Scenario 19	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 20	1.3609	1.1762	0.9899	0.9642	1.2539	Option 1
Scenario 21	1.8127	1.4145	0.9899	0.9642	1.5970	Option 1
Scenario 22	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 23	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 24	1.0475	1.0109	0.9899	0.9642	1.0158	Option 1
Scenario 25	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 26	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 27	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 28	0.9806	0.9756	0.9899	1.0648	0.9649	Option 4
Scenario 29	1.6968	1.3534	0.9899	1.0648	1.5090	Option 1
Scenario 30	2.2287	1.6339	0.9899	1.0648	1.9130	Option 1
Scenario 31	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 32	0.9611	0.9654	0.9899	0.9642	0.9501	Standard
Scenario 33	1.2623	1.1242	0.9899	0.9642	1.1790	Option 1
Scenario 34	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 35	0.8694	0.9170	0.9899	0.9642	0.8805	Standard
Scenario 36	0.9477	0.9996	0.9899	0.9642	0.9995	Standard