

Hedging an International Joint Venture Termination

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ABSTRACT

Lone Star Chemical is a chemical distributor, headquartered in Dallas, Texas. Mike Roberts founded Lone Star Chemical thirty years ago after a successful career in chemical sales and marketing. In 2014, Lone Star had formed a Swiss joint venture with HYD Limited to expand into European markets. HYD Limited had recently been acquired by a larger conglomerate and elected to terminate the joint venture prior to its expiration date, pursuant to the terms of the joint venture agreement. According to the joint venture agreement, HYD will make a total payment of 30 million euros over the next five years to Lone Star. The first payment of 15 million euros is due in two months, followed by successive yearly payments of 3 million euros for five years. Lone Star Chemical has no other foreign currency outflows and would like to hedge the payments against foreign currency risk.

Keywords: International finance, exchange rate risk, joint venture, risk management



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INTRODUCTION

Lone Star Chemical (LSC) is a chemical distributor, headquartered in Dallas, Texas. The company has grown steadily over the last thirty years since it was founded by CEO Mike Roberts. Mr. Roberts has guided LSC through economic recessions, commodity collapses, and competitive pressures by maintaining a conservative balance sheet. Access to capital during industry downturns allowed LSC to acquire additional land and equipment and expand storage capacity at favorable prices. Since 2010, employee headcount has increased five-fold and LSC has become one of the largest distributors in the region. Mr. Roberts also developed valuable contacts with a number of key chemical manufacturers by maintaining consistent volume orders with existing manufacturers but adding new manufacturers as the company increased market share.

A chemical distributor is a wholesaler purchasing chemicals in large quantities (bulk - barge, rail or truckloads) from a diverse group of manufacturers. They store bulk chemicals in groups of tanks surrounded by dikes in the event of a leak. Tanks receive and ship materials from multiple modes of transportation. Packaged chemicals are commonly stored in a warehouse. Distributors will blend, repackage, and ship in smaller quantities (less than truckload, tote tanks, 55-gallon drums, and any number of other smaller package sizes) as specified by industrial customers. In addition to the group of tanks and warehouse, a distributor needs access to specialized delivery equipment in order to properly handle the vast array of bulk chemicals received. A distributor provides customers with the value-added proposition of supplying the appropriate quantity and specification of material in a consistent timely fashion. This requires maintaining a sizable inventory and operating efficiently in a low margin environment. A successful distributor will possess a stable and varied customer base while maintaining diverse supplier contacts in order to ensure a complete product line is always available, at competitive prices.

CURRENT SITUATION

It was the first week in June when Mr. Roberts received a call from Caroline Heubert, president of HYD Limited, regarding a recent development in the LSCHYD joint venture. The 50-50 joint venture had been formed in 2014 as a means for both LSC and HYD to expand into certain European markets. The joint venture had produced positive cash flow distributions to LSC on a quarterly basis since 2017. While these cash flow distributions had started out small, growth had been steady and in recent quarters the cash flows from the joint venture had spiked. Last quarter, Mr. Roberts had heard rumors that HYD Limited may be an acquisition target, so he reviewed the contract regarding the LSCHYD joint venture. The call from Ms. Heubert confirmed Mr. Roberts' fears, HYD was being acquired by a larger conglomerate and was electing to terminate the joint venture prior to its expiration date, pursuant to the terms of the joint venture agreement. Mr. Roberts knew the bottom line from the early termination of the joint venture would result in a payment of 30 million euros to LSC spread out over the next 5 years. However, the news was not all bad as LSC was facing moderate liquidity concerns due to a recent opportunity to purchase a property near the Port of Houston.

Roberts walked down the hall to talk with Sara Rice, the operations manager who was responsible for overseeing the LSCHYD joint venture. She pulled up a consolidated report which showed financial statements from the joint venture over the last five years including dividend distributions which began in 2017. The dividend distributions are included in Exhibit 1. The dividend distributions were in euros and Sara noted there were no distributions from the joint venture during 2014 to 2016 as cash flows were being reinvested to accommodate growth-related capital requirements. From 2017-2020 the euro denominated dividend distributions had just been converted to US dollars by the bank at the 12 pm exchange rate the day the distribution was received.

Exhibit 1: Dividend distributions from LSCHYD joint venture and exchange rate

| Dividend Distributions | 2017 | | | | 2018 | | | |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Euro (thousands) | € 75 | € 75 | € 75 | € 75 | € 150 | € 150 | € 150 | € 150 |
| EUR:USD (#USD/1 EUR) | 1.0687 | 1.1442 | 1.1742 | 1.2001 | 1.2332 | 1.1705 | 1.1623 | 1.1441 |
| US Dollar (thousands) | \$80.20 | \$85.80 | \$88.10 | \$90.00 | \$185.00 | \$175.60 | \$174.30 | \$171.60 |
| 2019 | | | | 2020 | | | | |
| Dividend Distributions | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| | € 300 | € 300 | € 300 | € 300 | € 500 | | | |
| EUR:USD (#USD/1 EUR) | 1.1233 | 1.1391 | 1.0943 | 1.1202 | 1.103 | | | |
| US Dollar (thousands) | \$337.00 | \$341.70 | \$328.30 | \$336.10 | \$551.50 | | | |

Sara pointed out that when the euro strengthened relative to the US dollar, LSC was favorably impacted from exchange rate risk. Looking at the 2017 Q1 dividend distribution of €75,000, the exchange rate of \$1.0687/1 euro converted the dividend distribution into \$80,153, while the 2017 Q2 dividend distribution of €75,000 was exchanged at \$1.1442/1 euro resulting in US dollar distribution of \$85,815, an increase of over \$5000 compared to 2017 Q1. However, if the euro weakened relative to the US dollar, then LSC was adversely impacted. In 2018 Q1, the dividend distribution of €150,000 was exchanged at \$1.2332/1 euro resulting in US dollar equivalent of \$184,980. However, in 2018 Q2, the dividend distribution of €150,000 was exchanged at \$1.1705/1 euro resulting in a US dollar equivalent of \$175,575, a decrease of \$9,405. Since the dividend distributions were relatively small and uncertain from year to year, the finance office had not implemented any hedging techniques. Sara remarked that the finance office has some idea as to the forecasted distributions but only on a year over year basis. The fiscal year projections have been fairly accurate and allowed for consistent quarterly dividend payments, but the office tends to be conservative with our distribution forecasts. The joint venture has been one of the fastest growing segments for LSC which accounted for the increase in cash flow payments. Sara noted that since the finance office only looks at year ahead projections, the quarter over quarter exchange rate movement is favorable some quarters and unfavorable in other quarters, but the group had come to the conclusion that it would probably all even out in the end. The focus on growth and expansion in the joint venture had probably resulted in a neglect of at least an analysis of the exchange rate risk faced by LSC.

Sara pointed out that the early termination of the LSCHYD joint venture would result in a payment of 15 million Euros on or before August 10th, 2020 and 3 million euros in each of the following 5 years as shown in Exhibit 2. The termination agreement essentially called for an upfront payment of 15 million euros followed by annuity payment of 3 million euros for 5 years.

Exhibit 2: Scheduled Distribution to LSC from HYD Limited

| | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 | 8/10/2025 |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Payment to LSC | | | | | | |
| Millions (Euro) | € 15 | € 3 | € 3 | € 3 | € 3 | € 3 |

Sara noted that the cash distributions from the early termination of the joint venture were considerably larger than the quarterly dividend distributions and because the amount of the distribution was known in advance, some analysis of the impact of exchange rate movements on the future cash flows was desirable.

Later that afternoon, Mr. Roberts walked upstairs to the office of Berry Johnson, a recently hired MBA, to see if he had any insight into the impact of the joint venture termination on LSC's budgetary forecasts. Berry had been working on LSC's five-year financial planning forecast. The most pressing need for LSC was funding a \$60 million expansion near the Port of Houston. LSC had been working on acquiring a property near the port for three years and was in the late stages of negotiating a contract to purchase an existing facility.

Mr. Roberts and Berry discussed the fact that the first installment of 15 million euros due in two months was an unexpected cash infusion that will help LSC mitigate the costly Port of Houston expansion. At a current exchange rate of about \$1.14 per euro, the upfront payment was worth a little over \$17 million, of course it might be worth more if the euro strengthened or less if the euro weakened. Berry was not sure exactly what the annuity portion (3 million euros per year over the next five years) was worth but guessed it was equivalent to maybe \$12 or \$13 million today. Berry noted that the early termination of the joint venture might be able to fund half of the Port of Houston expansion project. Roberts suggested he would like to know more precisely much the US dollar equivalent of the early termination agreement might vary so LSC could best incorporate the divestiture payments into the financing plan of the Port of Houston project. Berry promised he would assess the foreign currency risk involved in the divestiture and provide some alternatives to possibly mitigate the risk to LSC. Berry and Mr. Roberts scheduled a meeting for the end of the week so Berry could present his findings to Mr. Roberts.

DATA COLLECTED

By mid-week, Berry had spent several hours talking with representatives from Commerze International Bank about hedging the currency risk associated with the termination agreement. Commerze had worked with LSC in the past and suggested that the first payment of 15 million euros due on August 10th could be easily hedged with a closed outright forward contract or if for some reason they expected the payment of 15

million to occur before August 10th, they could enter into a flexible forward contract with an August 10th maturity date. Hedging the five-year annuity portion could be done with a series of long-dated forward contracts. As an example, Commerze sent over a sample quote as of the 12 pm rate from June 10th and noted that the forward rate is simply the spot rate on the transaction date plus a premium, known as forward points, derived from the interest rate differential between the two currencies. Since the interest rate on the US dollar exceeds the interest rate on the euro, the premium is positive, and forward points would be added to the spot rate. Because the spot rate is quoted to the fourth decimal place, the points represent 1/10,000. For example, if LSC wanted to lock in the price to sell 1 million euros in 1 year, the forward rate would be the sum of the bid rate plus the forward points. The forward exchange rate would be $1.1402 + 92/10,000$ or $1.1402 + .0092$. This results in a forward quote of 1.1494 representing an exchange rate of \$1.1494/1euro. The representative from Commerze also noted that if Berry wanted to find a broken date quote, such as the 1.5 year forward rate, a simple interpolation between the 1 year forward rate and the 2-year forward rate could be used as a close proximity.

Exhibit 3

Forward Rate Quote on 6/10/2020

| | | Bid | Ask |
|---------|-----------|------------|------------|
| EUR:USD | Spot rate | 1.1402 | 1.1409 |
| Forward | 1-month | 8.1 | 8.6 |
| | 2-month | 16 | 17 |
| | 3-month | 24 | 26 |
| | 1-year | 92 | 98 |
| | 2-year | 187 | 196 |
| | 3-year | 290 | 305 |
| | 4-year | 405 | 430 |
| | 5-year | 540 | 568 |
| | 6-year | 690 | 745 |

The next day, Commerze called Berry to inform him that one of the banks clients, Alliant Insurance had expressed interest in offering \$31.5 million on August 10th, 2020 in exchange for the euro cash flows associated with the early termination of the divestiture. The deal was structured as a \$17 million payment in exchange for 15 million euros on August 10th, 2020 and an amortized senior secured loan of \$14.5 million, which LSC would pay back at a rate of 3 million Euros per year for 5 years.

Berry called Mr. Roberts to discuss the conversations with Commerze, including the offer from Alliant Insurance. Berry confessed to Mr. Roberts that the \$31.5 million offer from Alliant Insurance certainly had simplistic appeal, but he wanted to walk through the analysis before drawing any conclusions. Mr. Roberts suggested Berry should analyze the two components separately. Mr. Roberts noted the first piece of the analysis was straightforward, given the information provided by Commerze. LSC is being offered \$17 million for 15 million euros in 2 months by Alliant Insurance. If we wait 2 months and exchange 15 million euros at Commerze, we will either receive the

prevailing spot rate (which may be higher or lower than it is today) or if we choose, we can lock in a forward rate today to sell the euros in 2 months. The harder question is the annuity portion of termination agreement. LSC is expecting payments of 3 million euros beginning 1 year and 2 months from now followed by successive yearly payments of 3 million euros each year for an addition 4 years. Mr. Roberts suggested analyzing the annuity's present value as of August 10th. Berry liked the idea of a straight cash payment from Alliant but knew Mr. Roberts would be leery of an unsolicited offer without further analysis.

Berry went back to his office and looked up the original joint venture proposal and noted that the project discount rate used for the analysis of the joint venture was 14% even though at the time, the weighted average cost of capital (WACC) for LSC was 11%. There had been a 3% risk adjustment to the discount rate that was inserted due to the uncertainty surrounding an international project. The cash flows from the joint venture were more uncertain than their existing business, so the risk premium made sense to Berry. Additional financial documentation allowed Berry to estimate the average cost of capital for the new parent company acquiring HYD. The new HYD parent company had a cost of debt of approximately 5% and a cost of equity of 8%, resulting in a weighted average cost of capital of 6.5%. Berry knew that LSC's WACC was presently around 9%, with a cost of debt close to 6%. He sat down to take inventory of all the information he had collected and began to prepare for his meeting with Mr. Roberts scheduled at 11:00 am tomorrow.

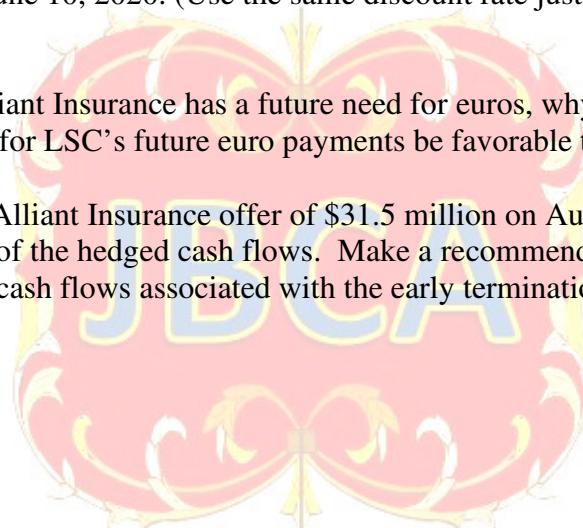
TASKS TO BE PREPARED

Berry compiled a list of tasks that needed to be performed before his meeting with Mr. Roberts. He would focus the analysis on three possible outcomes; a) leave the early termination cash flows unhedged and determine a range of possible values based on varying exchange rate scenarios, b) hedge the cash flows using the forward rates provided by Commerze Bank, c) take the \$31.5 million offer from Alliant Insurance on August 10th.

- 1) Assume that today is June 10th, 2020 and using August 10th, 2020 as the refence date, estimate the extent of the exchange rate risk faced by LSC if they choose to leave the initial 15 million euros payment due on August 10th unhedged. Include the following assumptions: the current direct bid spot rate for the euro is \$1.1402/1 euro, the percentage change in the EUR:USD exchange rate follows a normal distribution, and the expected percentage change between the spot rate in two months and the current spot rate is 0%, but the two-month periodic standard deviation in the percentage change between the spot rate in two months and the current spot rate is 2.86% (the annualized standard deviation is 7%).
- 2) Using August 10, 2020 as a reference date, determine the present value of the annuity portion of the early termination agreement (3 million euros per year for 5 years) assuming: a) a constant exchange rate scenario of \$1.14/1 euro per year for 5 years, b) a strengthening euro scenario in which the euro is trading at \$1.17/1 euro on August 10, 2020 and strengthens by 3.5% per year for the next 5 years, c)

a weakening euro scenario in which the euro is trading at \$1.11/1 euro on August 10, 2020 and weakens by 3.5% per year for the next 5 years. Justify an appropriate discount rate used in the analysis.

- 3) Using August 10th, 2020 as the reference date and the same discount rate used in the previous task, describe the extent of currency risk faced by LSC if they choose not to hedge the total euro cash flow payments using a scenario analysis. The base case scenario assumes the Euro remains at \$1.14/1 euro for the next five years. The best-case scenario assumes the euro will be trading at \$1.17 on August 10th, 2020 and will strengthen by 3.5% per year for the next 5 years. The worst-case scenario assumes the euro will be trading at \$1.11/1 euro on August 10th, 2020 and will weaken by 3.5% per year for the next five years.
- 4) Find the present value of the early termination agreement as of August 10, 2020 assuming the cash flows were hedged at Commerze Bank using the forward rates provided on June 10, 2020. (Use the same discount rate justified in previous tasks).
- 5) Assuming Alliant Insurance has a future need for euros, why might the offer of \$31.5 million for LSC's future euro payments be favorable to Alliant?
- 6) Compare the Alliant Insurance offer of \$31.5 million on August 10, 2020 to the present value of the hedged cash flows. Make a recommendation to Roberts regarding the cash flows associated with the early termination of the LSCHYD joint venture.



REFERENCES

Barchart.com, <http://www.barchart.com>.

CME Group, <http://cmegroup.com>.

NOTE: This is a fictitious case. All information contained herein was fabricated by the author. Any similarity contained herein is purely coincidental and is the responsibility of the author. Please contact the author directly with any concerns.



INSTRUCTOR'S NOTES

Answer to Question 1: The current spot rate (bid) is \$1.1402/1 euro. Assuming an expected percentage change between the spot rate on June 10th and the spot rate on August 10th at 0% with a standard deviation of 2.86%, the expected exchange rate is \$1.1402. The expected value of a 15 million euros payment on August 10th would be equal to \$17.103 million. However, if the standard deviation of the expected change is 2.86%, then the probability distribution of the exchange rate in two months and the corresponding range of US dollar equivalents on August 10th would be as follows:

| EUR:USD Probability distribution for spot rate in two months | | | | | | | |
|--|----------|-------------|----------|----------|----------|-------------|----------|
| | -2 Stdev | -1.65 Stdev | -1 Stdev | Expected | +1 Stdev | +1.65 Stdev | +2 Stdev |
| % change | -5.72% | -4.72% | -2.86% | 0.00% | 2.86% | 4.72% | 5.72% |
| EUR:USD | <=1.0750 | <=1.0864 | <=1.1076 | 1.1402 | >=1.1728 | >=1.1940 | >=1.2054 |
| Probability | 2.50% | 5% | 16% | | 16% | 5% | 2.50% |
| US\$ Value (mil) | \$16.13 | \$16.30 | \$16.61 | \$17.10 | \$17.59 | \$17.91 | \$18.08 |

Using the assumptions provided, there is a 68% probability the EUR:USD exchange rate in two months will be between \$1.1076/1 euro and \$1.1728/1 euro, corresponding to a US dollar value of the 15 million euros payment ranging from approximately \$16.6 million to \$17.6 million. There is a 95% probability the EUR:USD exchange rate exchange rate in two months will be between \$1.0750/1 euro and \$1.2054/1 euro, corresponding to a US dollar value between approximately \$16.1 million and \$18.1 million. Assuming a normal probability distribution with an expected percentage change of 0% for the spot rate in two months implies that LSC is equally as likely to receive more than the expected value of \$17.1 million as they are to receive less than the expected value. Mr. Roberts decision as to whether the additional currency risk is acceptable will depend on Mr. Robert's degree of risk aversion.

Some students may wish to use a Value-at-Risk (VAR) methodology to summarize the extent of the exchange rate risk associated with the initial payment. The Value-at-Risk methodology attempts to provide a single number summarizing the total risk exposure for a particular transaction. The 2-month maximum loss at a 95% confidence level VAR measure is determined by the lower boundary of the probability distribution approximately 1.65 standard deviations away from the expected percentage change in the exchange rate. This implies a -0.04719 change in the exchange rate ($0.0 + 1.65 * -0.0286 = -0.04719$). Since the expected spot rate in 2-months is \$1.1402/1 euro, a -0.04719 change in the expected spot rate in 2-months would result in an exchange rate equal to $\$1.1402 * (1 - 0.04719) = \$1.0864/1$ euro. Based on a 95% confidence level, the minimum amount received for the 15 million euros on August 10th would be equal to \$16.296 million. This represents a VAR measure of \$0.807 million found as the difference in the expected value (\$17.103 million) and the 95% lower boundary (\$16.296 million). Therefore, the initial payment of 15 million euros received in two-months would have a 95% VAR measure of \$807,000.

Answer to Question 2: The original project cost of capital of 14% is not an appropriate discount rate to use as the cost of capital for LSC has decreased from 11% to 9%. It may be argued that if a project cost of capital is to be used to discount the future cash flows, then adding a 3% risk adjusted premium to the current WACC would result in an appropriate discount rate of $9\% + 3\% = 12\%$. However, as the joint venture is no longer proving cash flows as dividends, the risk of future cash flows is not derived from the success of the joint venture itself, but from the HYD parent company's ability to fulfill the contractual obligation of the joint venture termination agreement, regardless of the joint venture's profitability. Therefore, a more appropriate discount rate for the future payments from HYD would be the cost of equity for the new parent of HYD at 8%. Under the three scenarios given, the net present value as of August 10, 2020 is provided below. The fixed exchange rate scenario values the annuity at \$13.66 million. Under a strengthening euro scenario, the annuity is valued at \$15.47 million. The weakening euro scenario values the annuity at \$12.03 million.

Scenario A) Fixed FX rate of \$1.14/1 euro, discount rate = 8%

| | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 | 8/10/2025 |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Euro (mil) | | € 3 | € 3 | € 3 | € 3 | € 3 |
| EUR:USD (#\$/1 Euro) | \$1.14 | \$1.14 | \$1.14 | \$1.14 | \$1.14 | \$1.14 |
| US\$ (mil) | | \$3.42 | \$3.42 | \$3.42 | \$3.42 | \$3.42 |
| NPV (\$ mil) | \$13.66 | | | | | |

Scenario B) Strengthening Euro, discount rate = 8%

| | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 | 8/10/2025 |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Euro (mil) | | € 3 | € 3 | € 3 | € 3 | € 3 |
| EUR:USD (#\$/1 Euro) | \$1.17 | \$1.21 | \$1.25 | \$1.30 | \$1.34 | \$1.39 |
| US\$ (mil) | | \$3.63 | \$3.76 | \$3.89 | \$4.03 | \$4.17 |
| NPV (\$ mil) | \$15.47 | | | | | |

Scenario C) Weak Euro, discount rate = 8%

| | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 | 8/10/2025 |
|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Euro (mil) | | € 3 | € 3 | € 3 | € 3 | € 3 |
| EUR:USD (#\$/1 Euro) | \$1.11 | \$1.07 | \$1.03 | \$1.00 | \$0.96 | \$0.93 |
| US\$ (mil) | | \$3.21 | \$3.10 | \$2.99 | \$2.89 | \$2.79 |
| NPV (\$ mil) | \$12.03 | | | | | |

Answer to Question 3:

| | EUR:USD rate 8/10/2020 | US\$ (mil) Initial Payment | EUR:USD % change Next five years | US\$ value (mil) Annuity | US\$ value (mil) Initial + Annuity |
|-------------------|---------------------------|-------------------------------|-------------------------------------|-----------------------------|---------------------------------------|
| Best Case | \$1.17/1 euro | \$17.60 | + 3.5% per yr. | \$15.5 mil | \$33.1 million |
| Base Case | \$1.14/1 euro | \$17.10 | No Change per yr. | \$13.7 million | \$30.8 million |
| Worst Case | \$1.11/1 euro | \$16.70 | - 3.5% per yr. | \$12.0 million | \$28.7 million |

The base case of no change in the value of the euro places a total value of the joint venture termination payments at approximately \$31 million assuming an appropriate discount of 8% for the annuity portion of the early termination agreement. The 15 million euros initial payment is assumed to be exchanged at \$1.14/1 euro on August 10th, 2020 which is equivalent to \$17.1 million. The annuity value is derived from the calculations in question 2 under scenario A and has a value of approximately \$13.7 million. The total value is determined from the sum the initial payment and the annuity. The best-case scenario would value the payments at approximately \$33 million. The initial payment 15 million euros exchanged at \$1.17/1 euro are equal to approximately \$17.6 million. The annuity value is derived from the calculations in question 2 under scenario B and is equal to \$15.5 million. The worst-case scenario indicates a value of approximately \$29 million, calculated as a value of approximately \$16.7 million for the upfront payment and as derived in question 2 under scenario C, the annuity is valued at \$12.0 million. The extent of the exchange rate risk faced by LSC for the early termination agreement would be an approximate expected value of \$31 million plus or minus \$2 million.

Answer to Question 4: Using the forward rates provided on June 10, 2020 by Commerze Bank, the 2-month forward rate to sell euros would be calculated as the bid spot rate plus the forward points associated with bid rate. The forward exchange rate would be $1.1402 + \frac{92}{10,000}$ or $1.1402 + .0016$. This results in a forward quote of 1.1418 representing an exchange rate of \$1.1418/1 euro on August 10, 2020. To find the forward premium points for August 10, 2021 as of June 10, 2020 an interpolation between the 1-year forward and 2-year forward would be required. The common interpolation formula of $y=y_1+{[(x-x_1)/(x_2-x_1)]*[y_2-y_1]}$ can be used to find the corresponding forward points. Since August 10, 2021 is 1 year and 2 months from June 10, 2020 the corresponding forward point estimate would be equal to the 1 year forward points plus 2/12 of the difference between the 2-year forward rate and the 1-year forward rate. This would be equal to $92 + (2/12)*(187-92) = 108$. Therefore the 1 year and 2-month forward premium would be approximately 108 points corresponding to a forward rate of $1.1402+108/10,000$ equal to 1.1510. A similar methodology is applied to calculate the remaining forward rate quotes.

Forward points and forward rates as of 6/10/20

| 6/10/2020 | | Forward points calculated from interpolation | | | | |
|---------------------|----------|--|-----------|-----------|-----------|-----------|
| Spot Rate | 2-months | 1yr+2m | 2yr+2m | 3yr+2m | 4yr+2m | 5yr+2m |
| 1.1402 | 16 | 108 | 204 | 309 | 428 | 565 |
| | | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 |
| Forward rate | 1.1418 | 1.151 | 1.1606 | 1.1711 | 1.1830 | 1.1967 |

Using the forward rates calculated from above, the present value of the early termination agreement as of August 10th, 2020 is calculated below:

Present value of euro payments hedged with a forward rate, discount rate = 8%

| | 8/10/2020 | 8/10/2021 | 8/10/2022 | 8/10/2023 | 8/10/2024 | 8/10/2025 |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Euro (mil) | 15 | 3 | 3 | 3 | 3 | 3 |
| Forward rate (#\$/1 Euro) | \$1.1418 | \$1.1510 | \$1.1606 | \$1.1711 | \$1.1830 | \$1.1967 |
| US\$ (mil) | \$17.13 | \$3.45 | \$3.48 | \$3.51 | \$3.55 | \$3.59 |
| NPV (\$ mil) | \$31.15 | | | | | |

The 15 million euros payment due on August 10th, 2020 would be equal to \$17.13 million using a 2-month forward rate of \$1.1418/1 euro. The annuity portion of the termination agreement would be equal to a net present value of \$14.02 million resulting in a total present value of the future cash flows equal to \$31.15 million at a discount rate of 8%.

Answer to Question 5: From Alliant's perspective, if they require euros for their operational needs, the \$17 million upfront payment for 15 million euros would be more favorable than obtaining euros in the forward market. The current forward rate to buy euros in 2 months would be the spot ask rate of 1.1409 plus the 2-month forward points equal to 17 for an equivalent forward rate of \$1.1426/ 1 euro. For Alliant, buying 15 million euros from Commerze Bank in two months using a forward rate would be equal to \$17.139 million. The cost savings to Alliant of \$139,000 would also be accompanied by the counterparty risk associated with the offer to LSC. Assuming Alliant has future euro needs, the annuity portion of the deal, \$14.5 million in exchange for 3 million euros per year for five years could be analyzed from Alliant's perspective as a loan to LSC. The loan to LSC of \$14.5 million would be equivalent to an investment of €12.69 million assuming the 2-month forward ask rate of \$1.1426/1 euro was used for analysis. An equivalent investment of €12.69 million that returns €3 million per year for five years would have a rate of return equal to 5.85%. Presumably, this must be a higher rate of return than Alliant could earn on similar risk loans denominated in euros.

Answer to Question 6: The \$31.5 million offer from Alliant Insurance exceeds the present value of the hedged cash flows of \$31.15 million. Since the deal is structured as a \$17 million payment from Alliant in exchange for 15 million euros on August 10th, 2020 this represents an implied exchange rate of \$1.1333/1 euro, which is less than the forward hedged exchange rate of \$1.1418/1 euro. The up-front payment from Alliant is less than the amount LSC would receive via a forward hedge at Commerze Bank by about \$130,000. However, the back-end of the offer from Alliant to exchange \$14.5 million on August 10th, 2020 in exchange for a level annuity of 3 million euros per year for 5 years exceeds the \$14.02 million equivalency of the forward hedged value of the annuity from LSC's perspective. This represents a surplus of about \$480,000 for the annuity portion of the early termination agreement. The offer from Alliant Insurance represents a net gain to LSC of about \$350,000 over a hedged valuation. If LSC decides to hedge the cash flows associated with early termination of the joint venture, then Berry would be justified in recommending the Alliant Insurance offer of \$31.5 million. However, if LSC decides to leave the payments unhedged, the present value of the early termination agreement would have an expected value of about \$30.8 million but could be worth as much as an equivalent of \$33.1 million or as low as \$28.7 million.