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Financial Risk Management

Throughout this course, we have discussed risk, generally in the context of risk and return. We use basic summary statistics such as the standard deviation ("volatility") as a measure of risk. For example, the annual volatility of Tesla's daily stock returns over the past five years is roughly 65%. Meanwhile, the annual volatility of the S&P 500 over this same period is about 22%. In terms of the CAPM, Tesla's equity beta to the S&P 500 is roughly 1.7. Thus, systematic risk (22% X 1.7) accounts for 37% and idiosyncratic risk the remaining 28%. By comparison, the annual volatility of Microsoft over the same period is 31%, less than the systematic component of Tesla's volatility, and slightly more than Tesla's idiosyncratic risk. Another approach is to look at the total risk of Tesla's enterprise and then further differentiate between the risk of Tesla's debt versus its equity.

Should Tesla target a lower volatility for its equity risk? If Tesla can reduce the volatility of its stock returns from 65% to 50%, does this risk reduction lead to an increase is shareholder wealth? That is, does the high volatility of Tesla's stock impede Tesla's effort to "create the most compelling car company of the 21st century by driving the world's transition to electric vehicles" (*Tesla Vision Statement*)? Or instead, is Tesla's high stock price volatility a byproduct of Tesla's super-aggressive business strategy? Stated differently, can Tesla reduce its high beta and high idiosyncratic risk without altering its business strategy? The likely answer is not by a lot. A company's cost of capital, beta, stock volatility, and various forms of multiples (e.g., EBITDA multiple) are largely an artifact of the underlying industry in which the company operates.

Notwithstanding Tesla's ambitious business strategy, there are ways in which management can reduce the overall business risk. For example, Tesla has a $2.5 billion line of credit with a banking syndicate, which it can access in the case of unforeseen negative economic shocks, such as Covid-19. Of course, even if rarely utilized, a pre-committed credit line can be costly to the borrower since it requires the bank or syndicate of banks to fund the corporation at a time when there is systematic economic stress on the overall banking system.[1] But for Tesla, the credit line can buoy its overall operating model and allow it to avoid having to raise additional funds during an economic crisis.

This lecture note discusses the relevance of financial risk management, including the purchase of insurance and use of hedging practices, both in perfect capital markets, and in the real world. As I show in the next section, there is no role for active financial risk management in perfect capital markets since investors can replicate a corporation's risk management decisions at zero cost. In the real world, however, financial risk management can play an important role in the success of a corporation, by facilitating the creation of value on the left-hand side of the balance sheet.

Financial Risk Management in Perfect Capital Markets

Modigliani and Miller proved over sixty years ago that capital structure has no influence on firm value in perfect capital markets. As discussed in the lecture note *Introduction to Corporate Finance*, perfect capital markets assume a world free of taxes, information asymmetries, transactions costs, and other real-world frictions. Moreover, in perfect capital markets, investors are unable to profit by trading securities or financial assets; thus, markets are considered efficient. However, even in perfect capital markets, cash flows are not known with certainty. Firms can exhibit risky cash flows in perfect capital markets just as they do in the real world.

Consider American Tower Corporation, which has thousands of cellular tower sites around the world. Cellular towers are steel structures which support antennas and other communications equipment for wireless carriers. Such towers are subject to a variety of risks, such as exposure to extreme weather, employee casualties resulting from building and maintaining the equipment, and theft. While cellular towers are designed to withstand strong winds, including hurricane force winds, they are not immune to Category 4 or 5 hurricanes – hurricanes with winds of 130-157 miles per hour or more) and certainly not to tornadoes. From a safety standpoint, working on cellular towers is one of the most dangerous occupations in the world, as it involves technicians climbing hundreds of feet in the air, often while carrying heavy equipment, amidst high and unpredictable winds. (Theft at cellular towers tends to mostly involve making off with copper wiring and occasionally backup batteries.)

American Tower has three basic ways in which it can address these risks. First, it can simply accept that these are the risks in their industry and doing nothing further than accounting for them in the NPV calculations. That is, when American Tower decides to construct a new tower, it will incorporate probabilities of the occurrences of these events and attempt to provide the optimal level of remediation consistent with maximizing shareholder wealth. Alternatively, American Tower can build towers which would withstand even the worst Category 5 hurricanes. And American Tower can construct towers which are easier to climb and with all the available guaranteed safety supports, thus eliminating nearly all

[1] Most large corporations have a revolver which they can draw on for emergency use. During March 2020 when the Covid-19 outbreak hit the U.S., many of these corporations immediately drew down their entire revolver, even if they had low expectation of needing the funds, to have cash in hand just in case. For example, General Motors, Ford, and Boeing drew down $45 billion in total on their revolvers.

fatalities. And it can put protective mechanisms and security cameras in place at the tower base to eliminate theft. While these preventive measures serve to reduce and even extinguish future bad events from occurring, the cost may be prohibitively high, and thus not economically feasible. In other words, overinvesting to eliminate these risk factors will not maximize +NPV. We can think of the first option as American Tower financially insuring itself against these various risks and negative outcomes. In the second option, American Tower operationally insures against these outcomes from occurring by constructing towers that are safer and more resilient (albeit in doing so, the company does not maximize +NPV).

The third option is that American Tower purchases insurance from a third party against the occurrence of these events. That is, American Tower constructs the towers, as in the first option, incorporating the optimal affordable level of safety and resilience in the face of these potential negative events, and then transfers the risks to an insurer. Consider the possibility of one or more cellular towers being destroyed or damaged by severe weather. American Tower has roughly 200,000 towers worldwide. Assume a blended repair/replacement cost of $125,000 per each negative event due to extreme weather. In any given year, the likelihood of extreme weather damaging cellular towers is 0.15 percent. Thus, American Tower expects to have 300 of its 200,000 towers damaged annually, at a total cost of $37.5 million. That is,

Eq. 1 Expected Loss = Tower Count × Loss Probability × Damages

$$\$37.5 \text{ million} = 200{,}000 \times 0.0015 \times \$125{,}000$$

American Tower has expected operating expenses of $6.1 billion. Thus, the expected annual losses due to weather-related tower damage is less than 1.0% of total operating expenses. Of course, in the event of a black swan event -- unprecedented extreme bad weather where several towers are located, the realized losses can be several times higher, and materially reduce net income. The issue for American Tower is two-fold. First, there is a lot of variability in the occurrence of weather events and thus there is the possibility of an extreme weather event, perhaps even beyond historical occurrences. Second, American Tower has zero control over the variability of extreme weather and its impact on their cellular towers once the towers have been constructed. Therefore, American Tower might consider a financial hedge against a volatile expense item beyond its control.

Assume that American Towers chooses to hedge 100% of its expected weather-related losses over the coming year. Thus, it will purchase insurance against $25 billion of maximum losses across the 200,000 towers around the world. For simplicity, assume a single insurance premium is made at the beginning of the year, and that the insurance company will make a single payment to American Tower at the end of the year to compensate the company, based on its aggregate losses. Assume there are zero administrative and operating costs during the year for the insurance company to manage its exposure. Finally, assume capital markets are perfect.[2] What is the price of the insurance?

Given competition and perfect capital markets, the insurance company will earn zero economic rents on the transaction. That is, the expected NPV will equal zero. If we assume that weather has a zero beta, or

[2] The assumption of perfect capital markets rules out moral hazard, namely that American Tower chooses to reduce its expenses on constructing the cellular towers if it has insurance in place against negative events.

zero correlation, to the stock market, the appropriate discount rate or cost of capital for the insurance company is the one-year risk-free rate.[3] The current yield on one-year U.S. Treasury bills is 4.9%. Thus, American Tower will pay an insurance premium of $35.75 million today against expected losses of $37.50 million and maximum losses of $25 billion.

Eq. 2 Insurance Premium = Expected Loss / [1 + Discount Rate]

$35.75 million = $37.50 million / (1.049)

Suppose American Tower also wants to insure against theft from its cellular tower sites. Assume the expected annual losses from theft are $37.50 million, the same as the losses from extreme weather events. To compare the estimate of the premium of insuring against theft to the severe weather premium, also assume a premium payment upfront by American Tower, and that the insurance carrier will make a single reimbursement payment at year end based on total losses.

Given the assumption of zero systematic beta risk with respect to severe weather, the appropriate discount rate or cost of capital is again the risk-free rate. For theft from cellular towers, it is possible systematic beta risk exists, albeit with a negative sign. That is, to the extent theft from cellular towers increases during market downturns, perhaps the underlying beta will be negative. For our purposes, assume a beta of -0.25. Further assume a market risk premium of 6.5% relative to Treasury bills. Using the CAPM, the discount rate for insuring against theft from cellular towers is:

Eq. 3

$$E(R_A) = R_F + \beta_A \times [E(R_m) - R_F]$$

$$3.275\% = 4.9\% + -0.25 \times 6.5\%$$

Using a discount rate of 3.275%, the insurance premium for theft from towers is:

$36.31 million = $37.50 million / [1 + .03275]

Given the negative beta for theft, American Tower will pay an upfront premium for theft insurance which exceeds the upfront premium for weather insurance (with the zero beta).[4] The payment of the theft insurance premium increases the expected profits of American Tower during market downturns and decreases the expected profits during upturns (that is, relative to not purchasing insurance against theft from towers). Thus, American Towers pays a higher insurance premium for theft insurance versus extreme weather insurance, given the negative beta, to compensate the insurance carrier on the other side of the

[3] We would not expect normal bad weather events to materially influence the stock market. However, a simultaneous clustering of numerous extreme bad weather events could generate a decline in the stock market. In this case, the risk of clustered extreme bad weather events will have a negative beta, albeit it in a non-linear relation. That is, in most states of the world, weather will have a zero beta, but in extreme states of the world, it will have a negative beta. Given the low likelihood of the extreme bad weather event negatively impacting the stock market, the zero-beta assumption is likely valid.

[4] I don't have a reliable estimate of the beta for theft from cellular towers and thus just assumed -0.25. Interestingly, in early 2022 when the one-year Treasury rate was 1.2%, it was the case that the insurance premium was $37.66 million to insure against expected losses in one year of a lesser amount, that is, $37.50 million, a consequence of the negative beta and the low risk-free rate.

transaction. Think of the insurance carrier as effectively being short the stock market, given the -0.25 beta, and thus must be compensated as such.

What is the impact of American Tower purchasing insurance with respect to severe weather and theft? The purchase of insurance will reduce the volatility of earnings and thus the overall risk of the corporation. Indeed, American Tower has transferred some of its risk onto an insurance carrier. But since American Tower is purchasing insurance at a fair price, the NPV is zero, and thus shareholders do not benefit from the purchase of insurance, at least in perfect capital markets. That is, American Tower does not possess information about weather or theft which places the firm at an advantage relative to insurance carriers. Moreover, to the extent some investors seek to avoid weather and theft risk, they can purchase insurance protection on their own.

Turning back to the Modigliani and Miller capital structure propositions, we know that in perfect capital markets, investors can replicate and undo any capital structure changes undertaken by management. For example, suppose management chooses to reduce shareholder risk by cutting back on leverage. This is a form of risk management which reduces the volatility of the stock. But investors can replicate this action by reducing leverage on their own. Likewise, in subsequent work, Miller and Modigliani demonstrate the irrelevance of dividend policy, as investor can easily create and undo dividends in their own personal accounts when perfect capital markets hold. The same goes for all financial decisions on the right-hand side of the balance sheet, including various forms of financial risk management, such as the purchase of insurance and the hedging of certain cash flows.

Financial Risk Management in the Real World

Corporate managers expend a lot of effort, money, and time on numerous risk management measures in the real world. Under Modigliani and Miller, shareholders instruct management to focus on the creation of shareholder wealth via the acceptance of all +NPV projects and the rejection of all -NPV projects on the left-hand side of the balance sheet. The post-modern framework of corporate finance continues that framework of value creation, accepting +NPV projects and rejecting -NPV projects on the left-hand side of the balance sheet. But it also stresses that financial policy matters and can influence the project selection decisions on the left-hand side of the balance sheet. Today, for example, we know that financial distress and information asymmetry can greatly limit a firm’s ability to undertake profitable investments when cash is constrained. External financing is not always readily available in the real world for +NPV projects, as assumed by Modigliani and Miller.

We next consider some hypothetical examples of firms facing investment decisions and analyze the feasibility of financial risk management in support of the underlying investments.[5] Consider the fictional drug company, BIOPHARMA, which maintains all its operations in the United States, but derives half of its

[5] These examples loosely follow a similar discussion in a seminal paper on risk management by Kenneth Froot, David Scharfstein, and Jeremy Stein, “Risk Management: Coordinating Corporate Investment and Financing Policies,” *Journal of Finance* (1993).

revenue outside the United States, primarily from the European Union. Based on current exchange rates, BIOPHARMA forecasts total cash flows of $500 million. But a substantial appreciation of the US dollar, relative to the euro, could lead to a reduction in cash flows to $200 million. Likewise, a depreciation of the dollar would increase BIOPHARMA's cash flows. In a Modigliani and Miller world, the investors of BIOPHARMA can easily hedge against such exchange-rate fluctuations if they choose to do so.

BIOPHARMA invests heavily in R&D to maintain the growth trajectory of its drug pipeline. Assume the R&D investment over the coming year to maximize shareholder wealth is roughly $350 million. Furthermore, due to the uncertain nature of its drug development pipeline, BIOPHARMA faces considerable constraints in raising external funds. That is, BIOPHARMA needs to rely on internally generated funds to finance its large investments in R&D. As covered in the lecture note, *Information Asymmetry and Capital Structure*, BIOPHARMA would be advised to retain excess cash on its balance sheet to offset any shortfalls in internally generated funds. However, BIOPHARMA has not had sufficient cash flows or external financing to establish sufficient cash by which to support its growing R&D program.

Now we can address how a risk management program to hedge BIOPHARMA's currency exposure can enhance shareholder wealth maximization, as illustrated in Table 1. I describe three scenarios in Table 1: (a) no change in the currency rate, (b) the dollar appreciates relative to the euro, and (c) the dollar depreciates relative to the euro. As described above, if currency rates between the United States and Europe remain stable, BIOPHARMA will have expected cash flow of $500 million, sufficient to fund its $350 million R&D program. But a substantial appreciation of the dollar reduces the cash flow to $200 million, below the optimal R&D investment of $350 million. For example, assume the $200 million amount of R&D spending generates NPV of $80 million, versus $120 million NPV for the optimal R&D of $350 million.

Table 1

BIOPHARMA USD/EURO	Cash Flow (no hedging)	R&D (no hedging)	Hedging P&L	R&D (with hedging)	Hedging Impact
No Change	500	350	0	350	0
Appreciate	200	200	150	350	190
Depreciate	800	350	-150	350	-150

The goal for BIOPHARMA is to hedge an amount which allows it to spend the optimal $350 million on R&D. BIOPHARMA can hedge the currency risk exposure with a currency forward contract, which sets the exchange rate in advance. That is, BIOPHARMA will attempt to lock in the expected revenues from Europe by selling euros at the forward exchange rate, since its non-U.S. revenue payments are in euros.

As displayed in Table 1, a stable exchange rate yields no hedging P&L, and BIOPHARMA moves forward to execute on its subsequent R&D expenditures of $350 million. With a strongly appreciating USD, the non-hedged cash flows plummet to $200 million which would result in an R&D reduction from $350 million to $200 million. However, since BIOPHARMA sold euros forward as a hedge against the appreciation of the dollar to ensure expected cash flows of at least $350 million, the hedging profits yield $150 million. The benefit of the hedging program is that it allows BIOPHARMA to realize the additional $40 million of NPV, spending $350 million rather than $200 million on the planned R&D.

In the scenario where the dollar depreciates substantially and thus BIOPHARMA realizes a loss on the currency hedge, it still has more than sufficient cash flows to carry out the optimal level of R&D. Overall, the hedging program is a success since it allows for sufficiently generated internal cash flows to undertake all +NPV projects and in all states of the world. In other words, when external funds are costly to raise due to either information asymmetry or costs of financial distress, a hedging strategy as part of a risk management program can better align the timing of cash flow receipts with that of its planned investments.

The second hedging example is DRILLOIL, a firm which specializes in oil exploration. Whereas exchange rate volatility is a major source of risk for BIOPHARMA, oil-price volatility is a major risk factor to DRILLOIL. When oil prices decline, DRILLOIL suffers a drop in cash flows from its existing oil-producing fields. Due to this decline in cash flows, DRILLOIL will generate less cash for the exploration of new oil properties. But when oil prices are low, the opportunities for exploration also diminish, because there is less demand to finance new ventures. And on the upside, when oil prices are high, cash flows for oil companies are high, and thus they have more cash to finance new exploration.

The cash-flow estimates for DRILLOIL, absent hedging, are identical to those for BIOPHARMA. Assuming oil prices remain stable over the coming year, DRILLOIL plans to budget roughly $350 million for its new exploration efforts, to maximize +NPV. In the event of a substantial decrease in the price of oil, the exploration budget will decline to $250 million. Should the price of oil increase, the exploration budget will increase (to $450 million).

Table 2

DRILLOIL Oil price changes	Cash Flow (no hedging)	Exploration (no hedging)	Hedging P&L	Exploration (with hedging)	Hedging Impact
No Change	500	350	0	350	0
Decrease	200	200	50	250	65
Increase	800	450	-50	450	-50

To ensure DRILLOIL will have sufficient cash flows to explore for new oil in a depressed oil market, management will engage in a hedging program, perhaps by selling oil futures to lock in a price today. It should provide for the $250 million budget to finance new exploration if oil prices decline. DRILLOIL will only need to hedge an amount which generates a hedging P&L of $50 million from declining oil prices. The hedging program of DRILLOIL requires smaller hedges than the BIOPHARMA hedging program since the optimal investment is reduced when oil prices are low.

While the DRILLOIL example calls for some hedging to ensure sufficient funds are available to fund exploration in a low oil-price regime, it is also possible that the optimal exploration investment would be sufficiently small in the low oil-price regime such that hedging is not needed. The point is not to say that DRILLOIL should not hedge, but rather that the company's incentives to hedge are less. For example, as shown in Table 2, the optimal exploration budget declines from $350 million normally, to $250 million when oil prices are low. Since DRILLOIL expects cash flows of $200 million when oil prices decline, it only needs a hedge to generate $50 million, as opposed to $150 million. The benefit of the hedge is that by allowing DRILLOIL to invest $250 million, the additional NPV is $15 million (beyond what the NPV would be if DRILLOIL only used the expected cash flow of $200 million).

In the two examples above, we show that hedging can increase value by offsetting market frictions such as information asymmetry, which can restrict the financing of +NPV projects with external funds. Another market friction I discussed in an earlier lecture note is the cost of financial distress. In a Modigliani and Miller world of perfect capital markets, financial distress is not costly. This is not to say that firms do not experience default in a Modigliani and Miller world, but that default is not costly, as the equity holders simply turn the keys to the company over to the debt holders, and there are no negative consequences involving customers, suppliers, employees, and so forth, which could reduce shareholder value.

In the lecture note *The Trade-off Theory of Capital Structure*, I describe how the tax benefits of debt financing are reduced by the cost of financial distress, which increases with the firm's leverage. In the two examples above, an acceleration in the exchange rate between the dollar and the euro, in the case of BIOPHARMA, or declining oil prices in the case of DRILLOIL, can lead to bankruptcy if they have significant debt in their capital structure.

In the case of DRILLOIL, suppose the optimal capital structure based on the simple trade-off between interest tax shields and cost of financial distress is roughly 15% debt and 85% equity. One major consideration in limiting debt to only 15% of the capital structure is the high volatility of oil prices. To the extent that DRILLOIL can successfully reduce the likelihood of financial distress via hedging oil prices, the benefit of hedging is that it allows DRILLOIL a higher level of leverage, and thus greater interest tax shields, than otherwise. The benefit of the hedging program is not that it reduces the volatility of the cash flows per se, but rather that it reduces the expected cost of financial distress at given levels of leverage.

Concluding Comments

Corporate managers are highly compensated, in part due to their ability to take good risks. Positive NPV projects are good risks to take, even though they may turn out to be disasters after the fact. There are numerous embedded risks within individual projects as well. Some are within the control of management, and other risks are outside of managerial control. Value can be created by hedging external risks, if such hedging reduces the likelihood of financial distress, or cash shortfalls. Moreover, considering agency costs, hedging can improve the alignment of incentives between shareholders and corporate management.

In perfect capital markets, hedging generates no value (zero alpha), even if such hedging results in lower risk overall. Investors can mimic hedging programs undertaken by corporate management and likewise undo any hedging program by engaging in offsetting transactions. That is true in the real world as well. But in terms of creating value via hedging in the real world, the company itself must undertake the hedging, such that by doing so, management is more apt to have sufficient cash for operations and for new projects, and/or reduce the likelihood of financial distress. In the real world, information asymmetry is the norm, and financial distress reduces value. Thus, hedging can create value if it provides the necessary cash flows to fund +NPV projects, even if the firm has experienced poor performance due to negative shocks beyond the control of management. Similarly, hedging can create value if it can reduce cash-flow volatility, and thus reduce the probability of financial distress, therefore allowing for greater leverage to generate higher interest-tax shields.

Consider the airline industry, for example. Air travelers generally purchase tickets well in advance of their planned flight, often a month or two in advance. The airline industry is highly competitive and thus profit margins tend to be narrow. The two big cost items for airlines are pilot compensation, at roughly 30% of total expenses and jet fuel at 25%. While pilot compensation is stable and predictable over short periods of time (as is the case of many of the other costs involved in running an airline), jet fuel can exhibit large price swings due to the high volatility of oil prices.

Given the lag period between the ticket purchase and time of travel, coupled with the volatility of jet fuel prices, an increase in jet fuel prices after the ticket purchase can eradicate the expected profits of a given flight, and even result in losses. The friction is that airline ticket prices can not automatically be adjusted at the time of travel, via fuel surcharges, because the tickets have already been purchased. To mitigate this risk, airlines can hedge against the jet-fuel price volatility risk by pre-purchasing fuel at the time of the ticket purchase, rather than waiting to buy fuel a couple of months later when the flight takes place.

Hedging against the jet fuel pricing risk is conceptually straightforward. In practice, however, it is a different matter. For example, the airline can't simply buy the physical jet fuel when the ticket is sold and take delivery, as it would then need to maintain storage facilities near various airports across the country. Instead, the airline hedge jet fuel prices via a financial instrument, for example, a forward contract with a third party to purchase jet fuel at a specified price and date of delivery. Speculators take the other side of the forward contract, as well as oil refiners looking to hedge against decreasing jet fuel prices. But if most airlines wish to hedge, and in the same direction, the forward market for jet fuel may not be liquid enough to handle all the price pressure from hedging. Consequently, many airlines hedge against jet fuel pricing risk by using more liquid measures of petroleum products, such as the underlying crude oil itself (such as by purchasing options in West Texas Intermediate Crude, for instance). Since jet fuel is a derivative product of oil, jet fuel prices closely track the prices of crude oil, albeit the cost of jet fuel is a little higher on average, due to the extra refining cost.

One issue in hedging via crude oil is that of basis risk, namely that jet fuel does not move in lockstep, with a premium, to oil prices. Instead, the difference in prices tends to exhibit volatility, and sometimes high volatility at that. Another issue with hedging against jet fuel price risk is that while short-term demand for air travel tends to be predictable, exceptions occur. For example, when COVID-19 erupted in the U.S. during March 2020, both oil prices and air travel plummeted. Those airlines which hedged via forward contracts were hit with a dummy whammy in 2020. They realized massive losses on their hedges, and they were over-hedged due to the abrupt decline in air travel. In other words, airlines not only paid way too much for jet fuel by hedging, but they also purchased way too much jet fuel relative to the actual consumer travel undertaken. In other words, due to the various frictions, the practical benefits of hedging during episodic events can be substantially less than the conceptual benefits.

While hedging can be difficult to implement in many industries, and thus may not always be beneficial, hedging is crucial for certain firms, especially financial institutions. Consider investment management firms, which specialize in arbitrage strategies. They identify securities which trade at lower values than somewhat equivalent securities. These discounts or mis-pricings tend to be small and eventually converge on average. Consider a stock merger, where the acquirer is trading at $20 and has reached an agreement to purchase the target company at 0.50 shares of the acquirer's stock for each share of target stock (or $10 a share at the current stock price of the acquirer).

Suppose the target stock is trading at $9.75, thus a discount of $0.25 to the $10 in value of the "equivalent" security. To capture the $0.25 spread, the arbitrageur will short 0.50 shares of the acquirer stock for each share purchase of target stock. Thus, the arbitrageur is long $9.75 of the target stock, and short $10.00 of "equivalent" target stock. By creating the hedge via shorting 0.50 shares of the acquirer stock, the arbitrageur locks in the profit of $0.25, irrespective of any movements in the acquirer's stock price. In contrast, if the arbitrageur simply purchases the shares of the target stock, the trade will generate profits only if the stock price of the acquirer remains above $19.50 at the consummation of the merger. To lock in the spread of $0.25, it is essential that the arbitrage firm moves quickly -- ideally simultaneously with the purchase of the target shares, as the expected profits could dissipate within a matter of minutes on the stock exchange, depending on the volatility of the acquirer's stock.

Given the direct link between the acquirer's share price and the target's share price, the hedge dramatically reduces the volatility of the target position by several-fold. Consequently, the arbitrage firm could lever the position significantly and yet still generate far less volatility than realized simply by taking a long position in the target stock. In such cases, the hedge is incredibly effective since the basis risk is so low. Thus, one can make a much stronger case for hedging various risks when such hedges do not generate substantial basis risk.