04 Hedging

Richard Heckinger, vice president and senior policy advisor, Ivana Ruffini, senior policy specialist, financial markets, Federal Reserve Bank of Chicago.

What is hedging? Hedging is a technique used to achieve a desired risk level, whereby an organization takes on a negatively correlated position (the hedge) to a currently held asset or liability. The motivation is to offset losses on one side of the hedge with gains on the other, thus preserving a desired price outcome.

The vast majority of the world's top 500 companies (94%) actively hedge their various risk exposures (ISDA, 2009). Still, it is important to keep in mind that hedging is done not only by sophisticated, publicly traded, global conglomerates, but also by counties, municipalities, and school districts; and occasionally, such entities incur large losses as a result. Examples include the near bankruptcy of Jefferson County, Alabama, and Erie City School District, Pennsylvania (Braun and Selway, 2008). Reports of these losses have prompted some to question whether all this hedging activity is necessary, or even desirable. While opinions on this subject differ, it is clear that hedging is a powerful risk management technique and that under certain circumstances, it is beneficial.

In this chapter, we demystify the concept of hedging and illustrate the risk–reward tradeoff inherent in hedges through examples. We explain how hedges work; the risks associated with hedging; and the relevant rules and regulations.

Risk–Reward Tradeoff

Predictability and growth of future cash flows are important for everyone—corporations, municipalities, non-profit entities, and individuals. Steady, increasing cash flows positively impact company valuations and access to capital. Conversely, poor cash flow forecasting and management can cause a liquidity problem for a firm and can even lead to its insolvency. Thus, control of earnings volatility is a key management objective for many organizations. Forecasting swings in revenues and costs depends on a myriad of factors, so management may be willing to cap potential expected returns in order to limit potential losses. One way to do this is through the implementation of a hedging program.

Some empirical studies show that while hedging is indeed widespread, the economic impact is minor (Guay and Kothari, 2003; Carter, Rogers, and Simkins, 2002; Smithson and Simkins, 2005). That is to be expected. By design, effective hedges are meant to stabilize expected cash flows. To understand the impact hedging has on the predictability of future cash flows, consider the following foreign exchange (FX) hedge scenario.

Example: A European company expects a payment from their U.S. client in June 2015 in the amount of $5 million. Upon the receipt of the payment, the company will need to convert the receivable denominated in U.S. dollars to euros. To eliminate the risk of an unfavorable exchange rate move, the company chooses to enter into a hedge using EUR/USD futures that expire in June 2015.

The current price of the June 2015 contract is 1.2195, which means that the current value of the receivable is EUR 4,100,041, which is $5,000,000 divided by 1.2195. The goal of the hedge is for the company to receive EUR 4,100,041 in June 2015, regardless of where the exchange rates end up. The company picks a futures contract with the size of EUR 100,000. In this case, the value of each contract in U.S. dollars is $121,950. Dividing the $5 million receivable by the contract dollar value gives us 41.00041, thus 41 contracts are needed to hedge the exposure. (See box 1.)

The example shows that through hedging the company was able to mitigate the impact of currency exchange rate fluctuations and eliminate volatility. It cost less than 3 euro to prevent a potential loss of 253,887.15 euro on one receivable. At the same time, the hedge also prevented the company from materializing a potential profit due to a favorable change in FX rates, which exemplifies the risk–reward trade off inherent in hedging activity.

Box 1 – FX Hedge Example

Possible profit and loss (PnL) outcomes on the day the receivable is paid.

1) **Euro strengthens against the U.S. dollar => 1 EUR = 1.3000 USD**
   Receivable value (RV) = USD 5,000,000/1.3000 = EUR 3,846,153.85
   3,846,153.85 – 4,100,041 = –253,887.15
   Loss on RV is EUR 253,887.15

   Hedge value (HV) = 41*100,000*(1.3 – 1.2195) = USD 330,050 or EUR 253,884.61
   Profit on HV is EUR 253,884.61

   RV+HV = –253,887.15 EUR + EUR 253,884.61 = –2.54 EUR

   The net of the receivable and the hedge position is a total loss of EUR 2.54.

2) **The exchange rate remains unchanged => 1 EUR = 1.2195 USD**
   Receivable value (RV) = USD 5,000,000/1.2195 = EUR 4,100,041
   4,100,041 – 4,100,041 = 0
   There is no change in RV.

   Hedge value (HV) = 41*100,000*(1.2195 – 1.2195) = 0
   There is no profit or loss on the value of the hedge.

   RV + HV = 0 + 0 = 0

   There is no change in PnL.

3) **Euro weakens against the US dollar => 1 EUR = 1.2000 USD**
   Receivable value (RV) = USD 5,000,000/1.2000 = EUR 4,166,666.67
   4,166,666.67 – 4,100,041 = 66,625.67
   Profit on RV is EUR 66,625.67

   Hedge value (HV) = 41*100,000*(1.2 – 1.2195) = –79,990 USD or –66,625 EUR
   Profit on HV is EUR 253,884.61

   RV + HV = EUR 66,625.67 + (–66,625 EUR) = EUR 0.67

   The net of the receivable and the hedge position is a total profit of EUR 0.67.

To Hedge or Not To Hedge?

That is the question, and there is no simple answer. Firms may choose to hedge to reap tax benefits, to protect against extreme events, or to avoid earnings volatility. Hedging is not a money

making strategy, but a loss limiting one. Of course, the goal is not to completely eliminate all risks, because doing so would also significantly reduce profits. Thus, management needs to decide which risk exposures should remain and which should be neutralized or reduced through hedging. The success of a hedging program depends on several important factors. First, a prospective hedger needs to have a detailed understanding of the various risk exposures of the enterprise as a whole. Second, the hedger has to evaluate the available hedging instruments and decide if any are suitable for the intended risk reduction strategy. Finally, a cost–benefit analysis must justify the hedge; otherwise the appropriate decision would be not to hedge.

Hedging is not a money making strategy, but a loss limiting one.

Comprehensive risk assessment is crucial for the design of an effective hedge. It is essential that management understands the enterprise-wide risk exposure and differentiates nominal transaction-level exposures from the aggregate net economic exposure. Why? Sometimes, natural (operational) hedges already exist within the business structure, but only become evident with the assessment of the aggregate exposure. Management may elect to offset risks through implementation of operational changes. For example, a company with sizable revenues in the European Union (EU) may decide to offset its FX risk exposure by establishing a fully operational subsidiary overseas, thereby incurring expenses in euros. On the other hand, hedging only nominal exposures can inadvertently compound enterprise risk. A McKinsey article on hedging offered an example of a company that almost "wiped out" its entire projected earnings with a natural gas hedge because the hedging manager did not realize that "the company's sales contracts were structured so that natural-gas prices were treated as a pass-through" (Fisher and Kumar, 2010, p. 1). In other words, the manager hedged a position that posed no risk to the business, thus creating a new exposure instead of eliminating one.

The availability of an appropriate hedging instrument is also significant. Most frequently, hedging is achieved through the use of financial contracts that offset a particular risk or risks. The desired risk exposure can be accomplished quickly and economically through the use of financial instruments such as derivatives. A typical hedge using derivatives involves entering into a derivatives

Table 1. Hedging by Industry–Global Fortune 500 Company Survey

Industry	# of comp.	% using derivatives	Interest rates	Derivative type (%) FX	Commodity	Credit	Equity
Financial	123	98	94	96	63	76	80
Basic materials	86	97	70	85	79	--	6
Technology	65	95	86	92	15	6	15
Healthcare	25	92	80	72	8	4	20
Industrial goods	49	92	86	86	37	2	20
Utilities	24	92	92	88	83	--	8
Consumer goods	88	91	81	84	39	1	9
Services	40	88	75	85	35	3	13
Total	500	94	83	88	49	20	29

Source: ISDA Survey Results: Derivatives Usage by the World's Largest Companies, April 2009, available at http://www.isda.org/press/press042309der.pdf.

contract with a strong negative price correlation to the underlying risk being hedged. Table 1 shows the derivatives usage by industry and type of derivatives instrument for Global Fortune 500 companies. The most commonly hedged risk is foreign exchange risk. It is hedged by 88% of the surveyed companies, followed by interest rate risk at 83%. Commodity and equity swaps are also frequently used across industries, with credit default swaps being used mostly by the financial sector.

Sometimes it is possible to hedge with highly standardized, exchange-traded derivatives contracts. Other times, a higher level of customization is needed to offset the risk, and over-the-counter (OTC) contracts are created to ensure an effective hedge. As we explained in previous chapters, choosing an OTC contract may perfectly mitigate certain risks—for example, basis and quantity risk—but it also introduces counterparty credit exposure. This counterparty exposure may actually be a desired exposure and serve as a natural hedge in some cases, but at least prior to the Great Financial Crisis, this risk seems to have been largely mispriced or ignored. The success of a hedging strategy hinges on the choice of the appropriate hedging

instrument, as well as constant monitoring of the positions to ensure that historical correlations hold during the duration of the hedge—sometimes positions need to be adjusted or new positions created to maintain a perfect hedge.

Cost–benefit analysis is the final step in the process of deciding whether hedging is an appropriate risk management strategy. Hedgers incur several costs. First, there are the direct costs of brokerage services and dealing spreads. Next, there are the overheads associated with managing a hedging program. As mentioned, basis and quantity risk can further increase hedging costs. Money used for margin deposits and cash flows needed for variation margin have opportunity costs associated with lost interest earnings (possibly a spread versus market rates) and other uses of the money. There is also a risk that a company's management does not communicate across the lines of business or is not qualified or experienced enough to understand the impact of its hedge positions under various market scenarios, which may result in over or under hedging (see Ford Motor Co. example in box 2). Finally, the purchase and possible abandonment of worthless (unexercised out-of-the-money) options can result in a cost that would be attributable to a hedge. If the costs are higher than the expected price risk, then hedging might not be justified.

Through their actions, most Fortune 500 companies have demonstrated that they believe the benefits of a hedging program are compelling enough to justify the investment of time and resources to establish them. Successful risk management through these programs is largely dependent on a disciplined approach to the assessment of risk exposures.

Risks Associated with Hedging

Hedging is not without risks. While hedging shares some attributes of insurance, it does not function the same way. The hedge pays off when the price of the asset or liability being hedged moves adversely due to changes in the market price. However, unlike insurance contracts where the maximum downside to the policy holder is the total premium paid (provided that the insurance company remains solvent), hedging can expose the hedger to significant losses (see examples in box 2 and box 3). Some risks, such as counterparty credit risk and settlement risk, are common across different markets, but other risks, like basis risk and quantity risk are endemic to hedging activity.

Box 2 – Ford Motor Company's $1 Billion Palladium Hedge Write-off

Large auto makers have traditionally participated in commodity markets to purchase commodities and hedge exposure to an increase in the price of raw materials that they use—including steel, copper, and palladium. As White (2002) explains, global demand for palladium almost quintupled between 1992 and 1996, and car manufacturers actively hedged their exposure. Certain geo-political developments further impacted the available supply of the metal and between 1998 and 2000, leading palladium prices to move from a previous high of $350 to a new high of $1,094 an ounce.

However, in 2000 new engineering advances enabled automakers to significantly reduce their use of palladium, while the increases in palladium prices over the previous years resulted in new suppliers entering the market. As a result of these developments, palladium prices fell to about $350 an ounce in late 2001.

Ford Motor Company implemented the engineering advances, resulting in a reduction in its need for the metal by about 50%, without communicating the change to its treasury department, which was responsible for both purchasing and hedging of raw materials. This lack of communication, coupled with lower prices of the metal, cost the company a $1 billion hedge write-off.

Basis Risk

A hedge does not have to be perfect to reduce risk exposure, and the risk that emerges as a result of imperfect hedges is basis risk. Specifically, the basis risk is the difference in the way the prices change between the derivative contract and the asset or liability being hedged. Generally, a lower historical price correlation implies a larger basis risk (and vice versa).

Basis risk is not a constant; it can fluctuate over the life of the hedge. It widens (increases) due to mismatches between the underlying exposure and the derivative contract used to hedge such an exposure. Thus, differences in dates (expiration, maturity, purchase), delivery instructions (location, transportation and storage costs), and changes in yield curves—all result in basis risk exposure.

The difference between the timing of the hedger's commercial transactions and the standardized delivery dates of exchange-traded derivatives creates the basis risk exposure. The price of forward, futures, or options contracts will converge to the cash price at the time the derivatives expire or result in delivery. Most contracts are closed out by an offsetting transaction before actual

delivery, thereby only realizing a gain or loss on the derivative contract that is applied to the cash market transaction as the purpose of the hedge. Commercial (cash market) transactions happen when needed, and are unlikely to happen exactly on the delivery day(s) of standardized exchange-traded derivatives contracts. Derivatives prices reflect the cost of carry, composed of interest, insurance, and storage costs, going forward, and the cost of carry will converge to the spot cash price at the time of the derivatives delivery or expiration. Therefore, such price differences and the rates at which they converge must be taken into account as components of basis risk.

Cross hedging is another example of a strategy that exposes the hedger to basis risk. Cross hedging is common for commodities without an active futures market or when an over-the-counter counterparty cannot be found. Highly correlated commodities may be used in a hedge; for example, jet fuel may be hedged with crude oil futures or sorghum with corn futures (Graff et al., 1997). Sometimes a combination of derivatives is used to create an optimal hedge position.

Example: Distillers' dried grain (DDG) is used as livestock fodder and does not have a liquid futures market, so cross-hedging strategies are employed to hedge exposure to DDG prices. The DDG is a corn product, but the nutritional content is closer to that of soybean meal, thus a combination of corn and soybean meal futures is used to hedge DDG positions (Brinker, Parcell, Dhuyvetter, and Franken, 2009).

Most hedges expose the hedger to some level of basis risk, which can arise from a divergence in prices between the swap or future contract and the underlying asset. Reassessing correlations, hedging weights, and hedging ratios is critical when hedging, as changes in the supply and demand of different products may result in changes in the correlation between them and thus require adjustments to ensure efficient hedging and risk reduction. Even sophisticated hedgers may suffer losses as a result of basis risk exposures—see example in box 3.

Quantity Risk

The risk of over or under hedging related to the number of contracts used in a hedge is referred to as quantity risk. Exchange-traded derivatives cover a standard size or quantity of the underlying instrument, and the use of such contracts may expose a hedger to quantity risk. As mentioned in previous chapters, OTC derivatives can be custom fit to the risk being hedged in order to reduce basis risk and

Box 3 – Southwest Airlines' $1.6 billion loss

According to its 1999 annual report, Southwest Airlines has been hedging its exposure to jet fuel price fluctuations since the late 1990s.[1] Several case studies have been written touting Southwest's successful hedging program. For many years, crude prices continually climbed. During that time, Southwest's hedges against rising prices worked very well. In the summer of 2008, the price of crude oil recorded new highs and Southwest's second-quarter gain on its hedges amounted to $1.2 billion net of taxes.[2] However, eventually oil prices began to drop and Southwest's hedging activities backfired in Q3:2008. Consequently, Southwest recorded a $1.6 billion loss on its hedge portfolio and had a losing quarter for the first time in 17 years (Jetter, 2008).

[1]Southwest Airlines 1999 Annual Report, page 18, available at http://southwest.investorroom.com/company-reports.

[2]Southwest Airlines, Form 10-Q, July 28, 2008, page 10, available at http://southwest.investorroom.com/sec-filings?s=127&year=2008&cat=.

possibly quantity risk through optionality features. Optionality might involve price floors or caps, as well as resets of price and quantity terms. Still, depending on the specific contract features, OTC hedges can also result in quantity risk exposure.

Example: A farmer has quantity risk in that she may have hedged a crop of an expected size based on the area planted and the expected crop yield. Due to variables such as the weather, seed quality, and the effectiveness of pest management, the actual yield might be less or more than the hedged amount. So if the farmer hedged, say, 10,000 bushels of wheat and realized a yield of 8,000 bushels, the hedge would be less efficient than expected. Alternatively, the actual yield might have been 12,000 bushels. The loss of hedge efficiency could result in an extra expense or a bonus in terms of the net hedged price of the crop.

The farmer's hedge example involved a static or passive hedge. The farmer could have adjusted the hedge as the yield projection became more accurate closer to harvest. Similarly, a bakery could hedge its purchases or holdings of wheat; and as its inventory of wheat gets consumed, it would adjust its hedge. However, in the farmer example above, the actual futures contracts exist in standard sizes of 5,000 bushels, thereby presenting choices of 5,000, 10,000, or 15,000 bushel sized hedges, each inefficient to some degree.

Quantity risk can also be managed through the use of options contracts— exchange-traded options on futures or OTC cash

options. The farmer would buy a put option (the right to sell the underlying product at a fixed price) and only exercise enough options to cover the actual quantity at risk (unless the over-hedged amount results in a bonus—in effect speculation). A grain elevator operator expecting to buy crops could buy call options (the right to buy the underlying product at a fixed price) and exercise them as crops are brought into inventory. Of course, the grain elevator operator would then be long the cash commodity and might seek to hedge his inventory holdings.

Diversification of risk is a portfolio optimization strategy. The goal of diversification is to reduce potential losses of a portfolio without impacting expected returns. This is achieved through the creation of a portfolio of uncorrelated positions. On the other hand, hedging activity involves trades that are negatively correlated to each other, which results in a reduction of both the expected returns and the expected losses.

In practice, hedging includes elements of art in the timing and balancing of hedges, as well as elements of science of knowing how the mathematics of hedging play out. Perfect hedges are difficult to achieve and understanding the risks eliminated and introduced by hedging activity is crucial to achieving the desired results.

Diversification of Risk ≠ Hedging

It is important to distinguish hedging from diversification of risk. Some use the two terms interchangeably (Coleman, 2009). Diversification of risk is a portfolio optimization strategy. The goal of diversification is to reduce potential losses of a portfolio without impacting (changing) expected returns. This is generally achieved through the creation of a portfolio of uncorrelated or minimally correlated positions, which can result in a consistent (less volatile) portfolio performance. On the other hand, hedging activity involves trades that are negatively correlated to each other, which results in a reduction of both the expected returns and the expected losses.

Regulatory Impact

A perfect hedge is meant to completely eliminate risk of a specific position. The perfect hedge should be 100% negatively correlated to the hedged position, and the holding period and other characteristics of the underlying asset and the hedge position should be equivalent. For example, an investor who owns a stock can protect against the

decline in the price of the stock by purchasing a put option on that stock and thus creating a perfect hedge until the expiration of the contract.

All these considerations are important in determining hedge efficiency. The efficiency of a hedge has always been important, but in recent years it has become even more significant not only as part of compliance with hedge accounting requirements, but also for compliance with the new regulatory requirements as outlined in the Dodd–Frank Act (DFA).

Hedge Accounting (FASB, 1998; IASB, 2014)

The use of derivatives for hedging can result in cash flows that are not symmetrical with the underlying cash position, thereby possibly distorting the profit and loss of the firm across accounting periods and obscuring the purpose of the hedge itself.

Futures contracts are marked-to-market, and variation margin is paid or collected each day (sometimes more often) in cash. A broker might require extra margin (collateral) to cover the actual flows. Options contracts tend to require payment of the option premium in full when the option is purchased, or margin to be deposited in the case of options sold. Uncleared OTC derivatives contracts require the deposit of "independent amounts" (initial margin) with variation margin requirements. Initial margins are typically refunded when the position is closed out (unless netted against other obligations), but variation margin and options premiums paid and received result in net gains or losses on the derivatives side of the hedge.

Such changes in value are real and normally would have to be recognized as a general operating profit or loss on operations, the market value of inventory, or services. Meanwhile, the cash side of the hedge might be revalued on the firm's books as an accrual and not taken into profit or loss until consummated by a sale or close out of that position. The mismatched result could cause volatile earnings that would not truly reflect the economically linked positions that constitute the hedge.

Consequently, hedge accounting standards address the earnings problem and several other accounting concerns regarding hedging. Hedge accounting standards were promulgated by the Financial Accounting Standards Board (FASB). Specifically, the changes in the prices (fair market value) of the item being hedged and the derivatives contract used for the hedge are recognized into earnings in the same accounting period. Any excess or shortfall

between the legs of the hedge (i.e., basis or quantity risk) is reflected in earnings as the measure of the "efficiency" of the hedge. Similarly, changes in value of anticipatory hedges (cash flow hedges) in which the uncertain leg is not yet consummated are reported as "a component of other comprehensive income (outside earnings)," and then reclassified into earnings when the anticipated leg affects earnings (FASB, 1998).

Hedge accounting standards require active measurement and description of a measurement method of a hedge's efficiency in order to maintain the accounting treatment. If the hedge is not sufficiently efficient, then the changes in value of the derivatives contract must be recognized in the earnings of the firm.

The Dodd–Frank Act

The DFA introduced comprehensive regulation of the over-the-counter derivatives market, including mandatory clearing for some and collateralization and reporting of all OTC derivatives transactions. OTC derivatives include interest rate (IRS), foreign exchange, credit default (CDS), and commodity swaps, to name a few. All of the aforementioned financial contracts are commonly used for hedging. The DFA also outlined criteria for categorizing participants in OTC derivatives markets into three groups—end users, major swap participants, and swap dealers. This differentiation between the market participants is based upon their type of activity, degree of leverage, and size of positions.

End users are defined as either non-financial entities or entities that use OTC derivatives to lessen or fully hedge commercial risk. End users do not have to be registered with U.S. Commodity Futures Trading Commission (CFTC), but the efficacy of their hedge positions is evaluated to justify qualification for the end-user exemption under the DFA (CFTC, 2012).

Major swap and major security-based swap participants include any entity that is not a swap dealer and satisfies one of the following conditions: (i) has a substantial swap or security-based swap position; (ii) has positions that may cause a significant counterparty risk exposure and negatively impact financial markets or the U.S. banking system; or (iii) is a highly leveraged financial entity (CFTC, 2012). Additionally, the term swap dealer or security-based swap dealer includes entities that are engaged in swap market-making activities and entities that generally trade swaps for their own account (with some exemptions based on the notional amounts that are traded) (CFTC/SEC, 2012).

Swap dealers and major swap participants are both subject to registration with the U.S. Commodity Futures Trading Commission (IRS, CDS, and commodity swaps) and U.S. Securities and Exchange Commission (security-based swap markets) and have to comply with certain documentation, capital, and reporting requirements.

The ISDA tracks swap volumes by market participant type. It reported that as of December 2013, derivatives trades between swap dealers represented 16.5% of total notional value outstanding, while financial end users and major swap participants represented 80.4% and non-financial end-users represented only 3.1% of the market (ISDA, 2014). They also found that trading activity of the non-financial end users "has remained more or less stable over the past 10 years" (ISDA, 2014, p. 9), while the trading activity between the dealers has "declined rapidly" (ISDA, 2014, p. 5). These findings suggest that the non-financial end user market segment was not negatively impacted by the recent regulatory changes.

Summary

Hedging strategies can be a valuable tool for managing risk if implemented properly. Understanding the total risk exposure of the company, as well as tracking and communicating the results of hedging are of vital importance for efficient and successful risk management. However, it is important to remember that downside risks do exist—and that investment in experienced staff and technology is crucial. In this chapter, we explained how hedging works, what products are used, and what can go wrong. In general, hedging is accomplished through the use of financial derivatives contracts. Chapter 3 discussed the size of the derivatives market—which is largely driven by hedging demand. Changes in global regulations of derivatives have begun to impact how hedges are executed and which financial instruments are used to achieve the desired risk exposure. Later chapters will discuss the changes in regulations and the evolution of derivatives instruments.

References

Braun, Martin Z., and William Selway, 2008, "JPMorgan, facing federal probe, exits municipal swaps," Bloomberg, September 4, available at http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aia5rMTvR2V0.

Brinker, Adam J., Joe L. Parcell, Kevin C. Dhuyvetter, and Jason R. V. Franken, 2009, "Cross-hedging distillers dried grains using corn and soybean meal futures contracts," *Journal of Agribusiness*, Vol. 27, Nos. 1/2, Spring/Fall, pp. 1–15, available at http://ageconsearch.umn.edu/bitstream/90654/2/JAB,Spr-Fall09,%2301,pp1-15.pdf.

Carter, David A., Daniel A. Rogers, and Betty J. Simkins, 2002, "Does fuel hedging make economic sense? The case of the US airline industry," paper, September 16, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=325402.

Coleman, Les, 2009, *Risk Strategies: Dialling Up Optimum Firm Risk, Farnham, Surrey*, UK: Gower Publishing.

Financial Accounting Foundation, Financial Accounting Standards Board, 1998, *Statement of Financial Accounting Standards No. 133: Accounting for Derivative Instruments and Hedging Activities*, Norwalk, CT, June, available at http://www.fasb.org/cs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1175820923424&blobheader=application%2Fpdf&blobheadername2=Content-Length&blobheadername1=Content-Disposition&blobheadervalue2=1302072&blobheadervalue1=filename%3Dfas133.pdf&blobcol=urldata&blobtable=MungoBlobs.

Fisher, Bryan, and Ankush Kumar, 2010, "The right way to hedge," Insights & Publications, McKinsey & Company, July, available at http://www.mckinsey.com/insights/corporate_finance/the_right_way_to_hedge.

Graff, Jennifer, Ted Schroeder, Rodney Jones, and Kevin Dhuyvetter, 1997, "Cross hedging agricultural commodities," paper, Kansas State University, Agricultural Experiment Station and Cooperative Extension Service, No. MF-2284, September, available at http://www.agmanager.info/livestock/marketing/bulletins_2/price_risk/hedging/mf2284.pdf.

Guay, Wayne, and S. P. Kothari, 2003, "How much do firms hedge with derivatives?," *Journal of Financial Economics*, Vol. 70, No. 3, December, pp. 423–461.

International Accounting Standards Board, 2014, Financial Instruments (replacement of IAS 39), "IFRS 9 financial instruments (replacement of IAS 39)," webpage, July, available at http://www.ifrs.org/Current-Projects/IASB-Projects/Financial-Instruments-A-Replacement-of-IAS-39-Financial-Instruments-Recognitio/Pages/Financial-Instruments-Replacement-of-IAS-39.aspx.

International Swaps and Derivatives Association, 2014, "Dispelling myths: End-user activity in OTC derivatives," research study, New York, August 11, available at http://www2.isda.org/functional-areas/research/studies/.

_____, 2009, "Over 94% of the world's largest companies use derivatives to help manage their risks, according to ISDA survey," news release, Beijing, April 23, available at http://www.isda.org/press/press042309der.pdf.

Jelter, Jim, 2008, "Southwest's treacherous oil hedges," MarketWatch, October 16, available at http://www.marketwatch.com/story/southwests-infatuation-with-fuel-hedges-backfires.

Smithson, Charles, and Betty J. Simkins, 2005, "Does risk management add value? A survey of the evidence," *Journal of Applied Corporate Finance*, Vol. 17, No. 3, June, pp. 8–17, available at http://econpapers.repec.org/article/blajacrfn/v_3a17_3ay_3a2005_3ai_3a3_3ap_3a8-17.htm.

U.S. Commodity Futures Trading Commission, 2012, "End-user exception to the clearing requirement for swaps," *Federal Register*, Vol. 77, No. 139, July 19, pp. 42560–42591, available at http://www.cftc.gov/ucm/groups/public/@lrfederalregister/documents/file/2012-17291a.pdf.

U.S. Commodity Futures Trading Commission, and Securities and Exchange Commission, 2012, "Further definition of 'swap dealer,' 'security-based swap dealer,' 'major swap participant,' 'major security-based swap participant' and 'eligible contract participant,'" *Federal Register*, Vol. 77, No. 100, May 23, pp. 30596¬–30764, available at http://www.cftc.gov/ucm/groups/public/@lrfederalregister/documents/file/2012-10562a.pdf.

White, Gregory L., 2002, "A mismanaged palladium stockpile was catalyst for Ford's write-off," *Wall Street Journal*, February 6, available by subscription at http://online.wsj.com/articles/SB1012944717336886240.