VOLUME 25 | NUMBER 1 | WINTER 2013

Journal of APPLIED CORPORATE FINANCE

A MORGAN STANLEY PUBLICATION

In This Issue: **The Future of Business Education**

Morgan Stanley

Margins, Liquidity, and the Cost of Hedging

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"I strongly suspect the subject of margins wouldn't even have been on your program a year or two ago. Other than for a speculator who just watched his long corn go limit down or his short soybeans go limit up, no one gave much thought to margins. Or to what they are, or what they do, or why we have them. A few years ago, in fact, our clearing corporation considered preparing a little booklet to explain margins. It never got published. The reaction to the idea ranged from an "ugh" to a "why?" The consensus was that margins are arcane, margins are dull, and, besides, who really cares?

That I am on this side of the speaker's table, that margins are on your program today, is one indication that the situation has rather suddenly changed. Commodity margins have suddenly become interesting. All at once, it seems that just about everyone cares. Market participants care. Newspaper and TV commentators care. Including those who'd barely even heard of futures markets until the day before yesterday. Government regulators care because there is no greater anathema than that which can be regulated but isn't. Additionally, of course, there are all manner of congressional crisis chasers. They, too, express care."

— Remarks by Walter Brinkman, President, Board of Trade Clearing Corporation, at a conference on speculation held in 1980 after the dramatic collapse of the Hunt brothers' silver corner following a change in the margin requirement.[1]

When a company hedges with a derivative sold on an exchange such as the CME, ICE or Eurex, which uses central counterparty clearing, the company is generally required to post margin. However, if the derivative is sold over the counter (OTC) by a dealer bank, it may not be cleared and the company may not have to post margin. The terms of the OTC derivative contract are up to the two counterparties. Often companies are required to post margin, but other times they are not. Even when a company must post margin, the terms governing when and how much is to be posted may differ from the terms imposed by a clearinghouse.

Recent regulatory actions introduced after the financial crisis of 2008 encourage greater use of clearing and therefore increased margining of derivative trades. They also impose margining requirements on OTC derivative dealers. These changes have significant implications for how corporations hedge with financial derivatives. In this paper, we review these changes and their implications for corporations, having in mind the value to the hedger of being granted the hedge with and without having to post margin. Our focus is on nonfinancial corporations—the so-called end-users of derivatives—seeking to hedge commercial risks, as opposed to financial speculators of various stripes and as opposed to financial intermediaries like the dealer banks. And the main question we seek to answer is this: Do margins significantly affect the cost of hedging and the way corporations hedge commercial risks?

1. Brinkman, Walter, 1981, "Margins: Much Discussed, Little Understood," in Lloyd Besant, ed., *Research on Speculation, Seminar Report*, Chicago: Chicago Board of Trade, pp. 68-83.

This issue has been very prominent since the debate leading to the passage of the Dodd-Frank Act in the U.S. in June 2010, and of the EMIR in Europe. A large number of corporations complained that the requirement to post margin would significantly raise the cost of hedging, and they demanded an exemption. For example, in a hearing in the U.S. House of Representatives in 2009 discussing the Treasury Department's proposal, Timothy Murphy, the Foreign Currency Risk Manager for the 3M Company testified that:

While we are mindful of the reduction in credit risk inherent in a clearing or exchange environment, robust margin requirements would create substantial incremental liquidity and administrative burdens for commercial users, resulting in higher financing and operational costs. Capital currently deployed in growth opportunities would need to be maintained in a clearinghouse. This could result in slower job creation, lower capital expenditures, less R&D and/or higher costs to consumers.[2]

In January 2010, the European Association of Corporate Treasurers submitted an Open Letter to the Commissioners of the European Union stating that:

We are deeply concerned by some of the proposed reforms to the OTC derivatives market currently being considered, in that they will disadvantage many end-users who rely on OTC derivatives to hedge underlying commercial exposures. Specifically, the intent to drive OTC derivative transactions into central clearing and onto exchanges will increase liquidity risk and funding costs through the requirement to post cash collateral…[3]

Ultimately, both the Dodd-Frank Act and the EMIR included some exemptions from the clearing mandate for derivatives bought by end-users for commercial hedging purposes. Debate continues, however, as the terms of these exemptions are specified in the implementing regulations, as legislators consider expanding or narrowing the exemptions, and as related banking and other regulations are written that affect margin and related credit practices.

We argue in this paper that these complaints about the costs imposed by a margin mandate are misguided. Our central point is that the cost normally attributed to the margin mandate is actually attributable to the underlying credit risk inherent in the derivative transaction. A mandate to post margin is just one way in which this cost can be pushed onto the company hedging with a derivative. If, instead, a dealer sells the company an OTC derivative without any margin requirement, the same cost arises and is paid by the company, but in a different form. The non-margined derivative entails greater credit risk, and the dealer charges for that, building in an extra premium to the bid-ask spread. It is the same cost of hedging, just paid for in a different guise. Negotiating an OTC derivative transaction does not magically reduce the credit risk inherent in the transaction, thereby lowering the real cost of hedging. The funding or liquidity provided by the non-margined derivative can be replicated by a margined derivative and a contingent line of credit that funds the margin. The contingent line of credit poses exactly the same liquidity and credit risk to the bank as the credit embedded in the non-margined derivative. Consequently, the mandate to margin is only a mandate to account separately for the credit associated with the derivative. The margin mandate imposes no additional cost.

Critics of a margin mandate often overlook the cost of credit that is implicit in a non-margined derivative sold OTC. However, some institutional practices may give rise to a real difference between credit that is implicit in a non-margined derivative contract and credit that must be granted explicitly to fund margin. We highlight two such practices. First is the different accounting for the two types of credit. Second is the different treatment by banking regulators, which can create a difference in the cost passed to bank customers. Of course these institutional practices do not actually make the non-margined derivative truly cheaper. There is no free lunch. But they can hide costs or misallocate them—for example, they may allow taxpayers to subsidize the credit risk in non-margined derivatives.

The Mechanics of Margin in Derivatives Contracts

Given the wide variety of settings in which derivatives are traded, there is no single, standardized set of margin rules. Practice differs across markets—futures exchanges v. OTC swap markets—across classes of participants within a market—clearinghouse members vs. customers, hedgers vs. speculators—across the life of a transaction—initial margin vs. maintenance margin vs. delivery month margin, and in the OTC market across individual transactions. Throughout most of this paper, we abstract from these many details, and discuss the generic issues involved with the practice of charging margin. We focus on a nonfinancial company purchasing a derivative from a dealer bank and examine the same transaction done with and without margin.

We construct a simple illustrative example of an oil-indexed swap contract negotiated between a nonfinancial company and a dealer bank. The swap is opened in November 2010 and has a single payment date three months later, in February 2011. The floating price is the price on an oil futures contract with delivery in March 2011. When the swap

2. Murphy, Timothy, 2009, Testimony to the House Financial Services Subcommittee on Capital Markets, Insurance, and Government-Sponsored Enterprises, Hearing on the Effective Regulation of the Over-the-Counter Derivatives Markets, Statement for the Record, June 9.

3. EACT, 2010, Press Release: Leading European companies unite against proposed derivatives regulation, January 6. http://www.igta.org/docs/OTC_EACT_PR_2010.pdf.

Table 1 **Cash Flows on a Non-Margined Swap**

Swap Terms:					
[1] Trade date:	November 2010				
[2] Payment date:	February 2011				
[3] Floating price:	Oil futures price, contract for March 2011 delivery				
[4] Fixed price:	$82.00 (March contract price on trade date)				
[5] Notional quantity:	10 million barrels				
[6]Margin required:	None				
Scenario #1: Falling Price					
[7] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[8] March Contract Price:	82.00	81.00	80.00	79.00	
[9] MTM Value:	0.0	-10.0	-20.0	-30.0	
[10] Swap Payment:	0.0	0.0	0.0	-30.0	-30.0
Scenario #2: Rising Price					
[11] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[12] March Contract Price:	82.00	83.00	84.00	85.00	
[13] MTM Value:	0.0	10.0	20.0	30.0	
[14] Swap Payment:	0.0	0.0	0.0	30.0	30.0

is opened in November 2010, the price on the March futures contract is $82/bbl, and this is the fixed price of the swap. The company buys the swap—that is, takes a long position—and so in February 2011 it will receive the difference between the floating and the fixed prices times the notional quantity of oil specified in the swap. The notional quantity is 10 million barrels. Table 1 shows the cash flows through time when the swap is not margined, while Table 2 shows the cash flows when it is margined. Because the mark-to-market value of the swap, the final swap payment, and the margin cash flows depend upon the evolution of the oil futures price, both tables show results for two scenarios. Scenario #1 is a path in which the price falls over time, and Scenario #2 is a path in which the price rises.

Cash Flows on a Non-Margined Swap

In Scenario #1, the mark-to-market value of the swap declines by $10 million each month. The total loss in value at the close of the swap is $30 million. This loss is not realized until the single payment date of February 2011, at which point the full $30 million is due.

Scenario #2 is the mirror image. The mark-to-market value of the swap increases by $10 million each month. At the close of the swap, the total gain in value is $30 million. This gain is unrealized until the single payment date of February 2011, at which point the full $30 million is received.

Cash Flows on a Margined Swap

In Table 2, the margin required is calculated off a base level of 15% of the notional value—the notional quantity times the current price on the March futures contract. However, we assume that the accrued mark-to-market gain or loss on the swap is credited or debited in calculating the required margin. For Scenario #1, line [10] shows the calculation of the 15% of notional value through time. Line [11] shows the calculation of net margin balance required, which is equal to the 15% of notional value less the mark-to-market value. At inception in November 2010, the futures price is $82/bbl, so the notional value is $820 million and 15% of the notional value is $123 million. Since the mark-to-market value is zero at inception, the company must post the full $123 million margin to open the position. Line [12] shows the monthly cash flow to and from the margin account. To keep the calculations in the example simple, we ignore the interest earned on the margin account.

In the succeeding two months, as the swap position accrues losses, the company makes contributions to maintain the margin balance. In Scenario #1, as the mark-to-market value on the swap declines, the company must make offsetting contributions to the margin account. However, since the notional value of the swap is declining slightly, the required contribution to the margin account is slightly less than the accrued loss each month. When the swap is closed out in February 2011, the margin account is closed and any funds are used either to settle the swap payment or are returned to the company. Line [13] shows the swap payment, and line [14] shows the net cash flow, which is the sum of the contributions to fund the margin

Table 2 **Cash Flows on a Margined Swap**

Swap Terms:					
[1] Trade date:	November 2010				
[2] Payment date:	February 2011				
[3] Floating price:	Oil futures price, contract for March 2011 delivery				
[4] Fixed price:	$82.00 (March contract price on trade date)				
[5] Notional quantity:	10 million barrels				
[6] Margin required:	15% of the notional value, less the mark-to-market value				
Scenario #1: Falling Price					
[7] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[8] March Contract Price:	82.00	81.00	80.00	79.00	
[9] MTM Value:	0.0	-10.0	-20.0	-30.0	
[10] Swap Payment:	0.0	0.0	0.0	-30.0	-30.0
[11] 15% of Notional:	123.0	121.5	120.0	0.0	
[12] Margin Balance Required:	123.0	131.5	140.0	0.0	
[13] Margin Cash Flow:	-123.0	-8.5	-8.5	140.0	0.0
[14] Net Cash Flow:	-123.0	-8.5	-8.5	110.0	-30.0
Scenario #2: Rising Price					
[15] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[16] March Contract Price:	82.00	83.00	84.00	85.00	
[17] MTM Value:	0.0	10.0	20.0	30.0	
[18] Swap Payment:	0.0	0.0	0.0	30.0	30.0
[19] 15% of Notional:	123.0	124.5	126.0	0.0	
[20] Margin Balance Required:	123.0	114.5	106.0	0.0	
[21] Margin Cash Flow:	-123.0	8.5	8.5	106.0	0.0
[22] Net Cash Flow:	-123.0	8.5	8.5	136.0	30.0

account and the swap payment. Lines [15]-[22] show the same calculations for Scenario #2.

Comparing Table 2 to Table 1, we can see that the total net cash flow on the margined swap is the same as the total net cash flow on the non-margined swap. But the timing of the cash flows is different due to the requirement to post margin. The margined swap forces potential losses to be prefunded. If the losses do not materialize, the money is returned. Hence, margin is often described as a performance bond.

Margins, Credit Risk, and the Cost of Hedging

Posting margin is a claim on scarce capital, and, therefore, buying a hedge and posting margin is costly. Other things equal, companies would prefer to hedge without posting margin. Other things equal, a higher margin raises the cost of hedging, thus reducing the amount of hedging. This in turn would increase expected financing costs, lowering the scale of investments and the value of firms. This is the argument made by critics of mandated margins.

The problem with this argument is the premise that one can avoid posting margin while keeping other things equal. Posting margin minimizes the credit risk borne by the bank selling the derivative. If the bank instead sells a non-margined derivative, then the bank shoulders credit risk not present in the margined derivative. This is costly for the bank, and it will charge the company accordingly. Most likely the company pays through the pricing terms on the non-margined swap.

Nonfinancial companies that imagine they are conserving capital by negotiating non-margined swap generally fail to recognize that, by taking the implicit credit embedded in the non-margined swap, the company is using up some of its debt capacity, just as it used its scarce capital when it had to fund the margin account. The funding of a margin account simply makes explicit the drain on the company's scarce capital.

When agreeing to sell a non-margined derivative, the dealer bank calculates the potential size of the liability that might accrue. The bank's credit committee will have to approve the derivative, just as if the derivative included a loan. Before approving the deal, the credit committee will review

Table 3 **Cash Flows on a Margined Swap + a Contingent Line of Credit**

Swap Terms:					
[1] Trade date:	November 2010				
[2] Payment date:	February 2011				
[3] Floating price:	Oil futures price, contract for March 2011 delivery				
[4] Fixed price:	$82.00 (March contract price on trade date)				
[5] Notional quantity:	10 million barrels				
[6] Margin required:	15% of the notional value, less the mark-to-market value				
Scenario #1: Falling Price					
[7] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[8] March Contract Price:	82.00	81.00	80.00	79.00	
[9] MTM Value:	0.0	-10.0	-20.0	-30.0	
[10] Swap Payment:	0.0	0.0	0.0	-30.0	-30.0
[11] 15% of Notional:	123.0	121.5	120.0	0.0	
[12] Margin Balance:	123.0	131.5	140.0	0.0	
[13] Margin Cash Flow:	-123.0	-8.5	-8.5	140.0	0.0
[14] Credit Line Withdrawals / Payments:	123.0	8.5	8.5	-140.0	
[15] Credit Line Balance:	123.0	131.5	140.0	0.0	
[16] Net Cash Flow:	0.0	0.0	0.0	-30.0	-30.0
[17] Difference from Non-Margined Swap:	0.0	0.0	0.0	0.0	0.0
Scenario #2: Rising Price					
[18] Date:	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Total
[19] March Contract Price:	82.00	83.00	84.00	85.00	
[20] MTM Value:	0.0	10.0	20.0	30.0	
[21] Swap Payment:	0.0	0.0	0.0	30.0	30.0
[22] 15% of Notional:	123.0	124.5	126.0	0.0	
[23] Margin Balance:	123.0	114.5	106.0	0.0	
[24] Margin Cash Flow:	-123.0	8.5	8.5	106.0	
[25] Credit Line Withdrawals / Payments:	123.0	-8.5	-8.5	-106.0	
[26] Credit Line Balance:	123.0	114.5	106.0	0.0	
[27] Net Cash Flow:	0.0	0.0	0.0	30.0	0.0
[28] Difference from Non-Margined Swap:	0.0	0.0	0.0	0.0	30.0

the company's file, examining its current credit rating, the set of other liabilities it has outstanding, its current cash flow situation, and so on. If the company has already used up all of its debt capacity, the bank is not going to approve the derivative. It will approve the derivative only if the company has some unused debt capacity, and the bank will count on that unused debt capacity to assure that it gets paid in the event that the price of the derivative moves against the company. And since each non-margined derivative contract approved consumes some of the company's debt capacity, there is a limit to the volume of non-margined transactions the dealer bank will approve.

To a first approximation, the cost of hedging with a non-margined swap is the same as the cost of hedging with a margined swap once credit risk is taken into account. This is because the ultimate source of the cost is the same, and the decision to charge a margin simply changes the channel through which that cost manifests itself. When the company has to fund a margin account, it sees an explicit cost in the use of scarce cash. When the company negotiates a non-margined swap, the cost is embedded into the terms of the deal, and the consumption of debt capacity is not explicit.

Cash Flows on a Margined Swap Combined with a Contingent Line of Credit

A useful way to show these points is to replicate the cash flow structure of the non-margined swap using a margined swap packaged together with a credit arrangement that funds the

margin account. A non-margined swap should be thought of as a package of (1) a margined swap, plus (2) a contingent line of credit to fund the margin. The credit line is contingent because the amount drawn varies according to the changes in the value of the swap and the payments under the swap.

To illustrate this, Table 3 extends our example to show the replication of the non-margined swap cash flows using a margined swap plus a contingent line of credit. Under Scenario #1, lines 9-13 show the margined swap items and lines 14-15 show the contingent credit line items. The line is drawn on to fund the margin account, and paid down when the swap is closed out. Line 16 shows the combined net cash flow on the margined swap plus the credit line. Line 17 shows the difference between the net cash flow on this package and the net cash flow on a non-margined swap. The same set of results is shown for Scenario #2, with line 28 showing the difference between the net cash flow on this package and the net cash flow on a non-margined swap. The fact that lines 17 and 28 are each zero in every period confirms that the combination of the margined swap and the contingent credit line replicates the cash flows to the non-margined swap. Although the example shows only two scenarios for the movement in the index underlying the derivative, the principle is clear. One can extend the example to any arbitrary movement; and in all cases, the cash flow obligations of the non-margined swap, on the one hand, and the margined swap plus a contingent line of credit, on the other hand, are identical.

The cash flows to the dealer bank are the mirror image of the cash flows to its customer, the nonfinancial company. Therefore, the dealer bank that offers a company a non-margined swap has the exact same cash flow payoffs as a dealer bank that offers the package of (1) a margined swap, plus (2) a contingent line of credit to fund the margin.

A company that prefers the cash flow pattern of a non-margined swap can replicate it using a margined swap plus the contingent line of credit. Therefore, a margin mandate is nothing more than the requirement to make explicit the credit line embedded in a non-margined swap.

Credit Risk and the Cost of Hedging

Hedging is costly. But the real source of the cost is not the margin that is posted. The real source of the cost is the underlying credit risk that motivates counterparties to demand that margin be posted. In a study published in 2000, we constructed a dynamic model of hedging and credit.[4] A company has limited debt capacity and can hedge with a futures contract. There is no direct cost to using the futures contract. In particular, there is no formal margining and no margin charge. Nevertheless, the model shows that a company is very "conservative" in its hedging in the sense that it hedges less than what would minimize the volatility of its cash flows or the volatility in its market value. Why? The answer is that, except in the extreme case when the hedge is perfect, hedging uses up the company's scarce debt capacity. In practice, all hedges involve a certain amount of basis risk, and there will be some circumstances when the dealer is exposed to default by the hedger. This cost increases as the scale of the hedging gets larger. The dealer must charge for this credit risk, and it is the price paid to cover the credit risk that constrains a company from hedging more. So credit risk is the real underlying factor making hedging costly, not the cost of posting margin.

To emphasize that credit risk is the key, one can examine the model for the case in which the hedge is perfect. In that case, the hedge creates its own liquidity and becomes costless. And it completely eliminates the company's limited debt capacity. The model, therefore, illustrates the fact that limited debt capacity and credit risk is the ultimate source of the cost of hedging.

The practice of margining is just a channel through which the drain on the company's debt capacity is made apparent to the company. In a study published in 1999, we also demonstrate how the interaction of the structure of the hedge with the determinants of a company's credit quality determines the optimal scale of hedging and the optimal structure of a hedge.[5]

The Cost of a Margin Mandate

A mandate to margin all derivative transactions does not add any new cost to hedging. With a non-margined derivative, the company is procuring the two parts of the package rolled into one product: the credit is implicitly embedded in the terms of the contract. The margin mandate merely forces the credit to be marketed and accounted for separately as an explicit arrangement alongside the margined swap. The same bank that had formerly sold an implicit line-of-credit embedded in a non-margined derivative can now sell an explicit line-of-credit to fund the margin. It makes the same credit evaluation it had done before, and will have the same credit exposure it had before. The mandate does not add any cost to the company.

In the course of debating the provisions of the Dodd-Frank Act, and then again in the debate over the regulations to implement the Act, a number of industry-sponsored studies produced large estimates of the costs that would be imposed on nonfinancial companies if margins were mandated.[6] All of these studies suffered from a common mistake: they assumed away any credit cost associated with a non-margined derivative, and treated the cost of any margin as if it were an incremental cost. None of them had a methodology for calculating a truly incremental cost.

4. Mello and Parsons (2000).
5. Cooper and Mello (1999).
6. See, for example, Keybridge Research (2011), NGSA (2010) and EEI (2010).

Table 4 **End-User Balance Sheet, January 2011, with Non-Margined Swap**

	Assets	Liabilities	
Total cash	200	20	Gross derivative liabilities
Gross derivative assets	0	640	Other liabilities
Other assets	960	660	Total liabilities
		500	Equity
Total	1,160	1,160	Total
Notes to the Financial Statement:			
Ratios:			
Cash to Total Assets	17%		
Liabilities to Total Assets	57%		

Dynamic Adjustment

We have noted that a non-margined swap is equivalent to a package of (1) a margined swap, plus (2) a contingent line of credit to fund the margin. It is worth emphasizing the contingent nature of the line of credit. In our examples, we have shown only two scenarios for how the index underlying the derivative might move over the life of the contract. Looking at the two drawdowns of the credit line in Table 3, one can see the contingent character. The true range of potential drawdowns is much larger—as large as the range of movement in the underlying index.

What is the size of the contingent credit line associated with the margined swap in Table 3, and how does it compare to the implicit contingent credit line embedded in the non-margined swap in Table 1? If the non-margined swap is truly a fully non-margined swap, the dealer bank can calculate its maximum exposure, and this tells us what must be the size of the implicit contingent credit line. In our example this is $820 million. For the package in Table 3 to replicate the non-margined swap, the credit line must have a limit of $820 million.

In practice, so-called non-margined swaps are actually accompanied by various limits on the size of the accrued liability, so that there is a much lower limit on the implicit credit line embedded in the swap. Once the limit is reached, the company must either post margin, liquidate the swap, or otherwise adjust the position.

In practice, a company using margined swaps and funding margin calls from a credit line is unlikely to specify fully all contingencies and the full scale of the potential call on a credit line up front. It will often start out with one credit limit, and then dynamically adjust the size of the explicit credit line as the line is drawn down or paid off. Consequently, one needs to take care in making comparisons between a specific non-margined swap and a specific margined swap funded with a credit line. For the two packages to be truly equal, the full dynamic structure of the position needs to be taken into account.

The public debate often casually discusses the OTC swap market as if all swaps are non-margined and as if there are no limits. But this casual description belies the facts. A large portion of swaps do include margining. When a swap is not margined, the master swap agreement governing the customer relationship specifies a maximum threshold on the accrual of derivative liabilities, beyond which the nonfinancial company must either post margin or adjust its positions. The dangers facing end-users in stressed market conditions are dangers they already face in a world without a margin mandate. End-users already occasionally find themselves bumping up against their exposure limits, at which point they are forced to decide either to close out or modify a hedge, or to find extra funds to post as margin so as not to exceed exposure limits.

It is worth emphasizing one more time that a non-margined derivative is just a package of two components: a margined derivative and a contingent line of credit. Under a margin mandate, the only contingent credit line that an end-user needs is the very contingent credit line already implicitly embedded in the non-margined derivative. There are no additional burdens, costs, or constraints that are not already present in the OTC market without a margin mandate. Therefore, the dynamic feature of the problem does not create any costs for a margin mandate.

Institutional Practice

A number of critics of margin mandates point to the fact that the OTC swap market dominates trade in derivatives as ipso facto proof that bundling the credit line into the derivative is somehow better. For example, Craig Pirrong writes that "the large size of the OTC derivatives markets…provides a clear demonstration that this bundle generates more value for end-users and buy-side firms than the unbundled exchange-traded

Table 5 **End-User Balance Sheet, January 2011, with Margined Swap**

	Assets	Liabilities	
Cash in margin account	140	20	Gross derivative liabilities
Other cash	200	640	Other liabilities
Total cash	340	660	Total liabilities
Gross derivative assets	0	640	Equity
Other assets	960		
Total	1,300	1,300	Total
Notes to the Financial Statement:			
Ratios:			
Cash to Total Assets	26%		
Liabilities to Total Assets	51%		

alternatives."[7] Of course, there does have to be some explanation for the size of the OTC market, but there are many possible ones. It is telling that these critics do not have any affirmative proof that the bundled product actually provides more value; they simply deduce that by assuming away any of the other possible drivers.

Here are two key examples of how institutions treat the explicit line-of-credit used to pay margin differently from the implicit line-of-credit embedded in a non-margined derivative.

Accounting

How does the financial accounting at a nonfinancial company treat a non-margined swap and a package of (1) a margined swap, plus (2) a contingent line of credit to fund the margin? Tables 4, 5 and 6 show the accounting impact of the three different hedges described in Tables 1, 2 and 3. Our focus is on comparing Tables 4 and Table 6.

First, as the swap plays out over time, accruing either a mark-to-market loss or gain, in both cases the company's accounts will show these on the balance sheet. In this respect, the non-margined swap and the package of a margined swap with a contingent line of credit are identical.

Second, as shown in Table 6, the company with the margined swap will show the balance of its margin account as an encumbered cash asset, and there will appear an offsetting liability for the balance outstanding on the credit line. As shown in Table 4, the company with the non-margined swap will show neither of these entries. Therefore, although the net asset/liability position shown on the balance sheet is the same for the two companies, the gross values shown differ.

Third, and finally, as shown in Table 6, the company with the explicit contingent credit line will mention the unused portion of the credit line in the notes to the financial statement. The company in Table 1, with the non-margined swap that includes an implicit contingent credit line, will not report such information.

These two differences could lead management to prefer hedging using non-margined derivatives for a number of reasons. Management might be deceived about costs by the fact that the contingent credit associated with a non-margined swap is not explicitly recognized in the financial statements. Or management might prefer that shareholders are not fully informed. The differential treatment might also have an impact through ratios embedded in bond covenants or other contractual relationships.

Currently, mandating margining simultaneously entails making the financial statements and accompanying notes more informative. It is hard to imagine a cogent public policy argument being made in favor of maintaining the less informative system of non-margined derivatives.

Bank Regulations

Bank regulations treat the implicit credit line embedded in the non-margined swap differently from an explicit contingent line of credit. The difference was greater before the 2008 financial crisis, but still persists in the new proposed capital rules of Basel III. An explicit line-of-credit runs through the banking book, where credit risk and the associated capital requirements are calculated one way. The credit risk associated with non-margined derivatives runs through the trading book, where credit risk and the associated capital requirements are calculated in a different way. The same credit risk faces different capital charges according to the prevailing regulations applicable to the two parts of the bank.

7. Craig Pirrong, "Derivatives Mandates: Blessing or Curse?," *Journal of Applied Corporate Finance* Vol. 22 No. 3 (Fall 2011).

Table 6 **End-User Balance Sheet, January 2011, with Margined Derivative + Line of Credit**

	Assets	Liabilities	
Cash in margin account	140	140	Used line of credit
Other cash	200	20	Gross derivative liabilities
Total cash	340	640	Other liabilities
Gross derivative assets	0	800	Total liabilities
Other assets	960	500	Equity
Total	1,300	1,300	Total
Notes to the Financial Statement:			
Undrawn amount on line of credit:	680		
Ratios:			
Cash to Total Assets	26%		
Liabilities to Total Assets	62%		

In retrospect, regulators now realize that before the crisis, the potential credit risk from the embedded line-of-credit in a non-margined swap was significantly underestimated.[8] The proposed rules for Basel III attempt to rectify that with new capital charges for this embedded risk. However, the capital charges will still be calculated differently for the banking book and the trading book. There is no automatic equality between the two, and regulators in different countries may implement the new capital rules differently.

In fact, many end-users and dealers are lobbying to preserve the favorable treatment of the implicit line-of-credit embedded in a non-margined derivative. In implementing the Dodd-Frank Act, a number of regulators in April 2011 proposed a rule regarding swap margin and capital requirements for dealers, as opposed to the margin requirement for end-users.[9] Complaining about how these charges will raise the cost of non-margined derivatives, these parties have been lobbying Congress to block the bank supervisors from assessing appropriate and comparable capital charges. Were this to happen, it would re-create a real cost differential favoring the sale of non-margined derivatives over the sale of a margined derivative with an associated contingent line of credit. But the differential would reflect a cross subsidy stemming from the differential regulatory treatment, and not a cost differential reflecting a true difference in social cost.

Conclusion

We present a replication argument to show that a non-margined swap is equivalent to a package of a margined swap plus a contingent line of credit. A mandate to clear and, therefore, to margin derivative trades forces derivative dealers to market these two components separately, but otherwise makes no additional demand on nonfinancial corporations. Therefore, a clearing and margin mandate does not add any real costs to a nonfinancial corporation seeking to hedge its commercial risk.

Nonfinancial companies focus on the cost of posting margin. We point out, however, that this is just confusing the messenger with the message. Posting margin is costly, but the cost comes from the credit risk inherent in hedging. Non-margined derivatives embed this same cost in the price terms of the derivative. Margined derivatives force this cost to be priced separately and explicitly in the line of credit that must be raised.

The replication argument shows that the first-order cost imposed on nonfinancial corporations by a clearing and margin mandate is zero. However, there may be second order costs that arise if other institutions treat the credit implicit in a non-margined derivative differently from the credit in a margined derivative. We discuss how accounting regulations and bank capital regulations may give rise to some differences. We also place the current debate in the context of the longer history of debate over the rules for margining derivatives.

Many people who are unfamiliar with the long history of derivatives markets in the U.S. think of the Dodd-Frank Act's reform of the OTC derivatives markets as a regulatory gamble that imposes new, untested rules on the markets. Exactly the opposite is true. Far from being a new and untested regulation, central counterparty clearing is a landmark innovation of late 19th-century derivative markets. Central counterparty clearing was introduced to the U.S. in 1896 by the Minneapolis Grain Exchange, home to derivative trade in grains. This innovation helped to reduce the aggregate amount of risk in the system and therefore lowered the amount of capital required to manage

8. Basel Committee on Banking Supervision (2009).

9. Federal Reserve (2011).

derivative markets. This lowered the cost charged to nonfinancial companies hedging with derivatives. Central counterparty clearing also improved access to the derivative market, keeping the market competitive and growing. Established derivative exchanges in other cities gradually recognized these advantages of central counterparty clearing and copied this innovation.

As new futures exchanges were established, central counterparty clearing was often the chosen structure right from the start. This was the case at the Chicago Mercantile Exchange, established in 1919 for trade in butter, eggs and other products. In 1925, the Chicago Board of Trade, which was the largest derivatives exchange at the time, switched to central counterparty clearing. From that date forward, central counterparty clearing reigned as the standard practice for derivatives trading in the U.S., and remained so for the next 50 years. This was an era that worked well for commercial enterprises looking to hedge their business risks, and an era that worked well for a growing U.S. economy. The main spirit behind the Dodd-Frank Act's reform of the OTC derivatives market is to return the country to a framework that served the country well throughout the 20th century.

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Journal of Applied Corporate Finance (ISSN 1078-1196 [print], ISSN 1745-6622 [online]) is published quarterly, on behalf of Morgan Stanley by Wiley Subscription Services, Inc., a Wiley Company, 111 River St., Hoboken, NJ 07030-5774. Postmaster: Send all address changes to JOURNAL OF APPLIED CORPORATE FINANCE Journal Customer Services, John Wiley & Sons Inc., 350 Main St., Malden, MA 02148-5020.

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