ABCs of Interest Rate Risk Management

For Banks

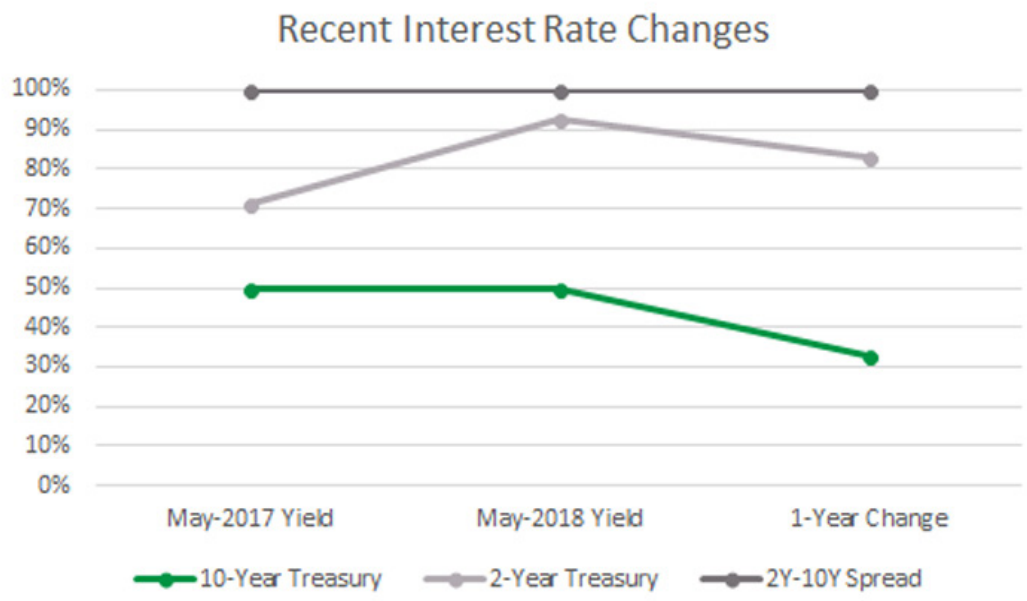
www.hedgestar.com

Contents

Introduction

The purpose of this e-book is to introduce the concept of managing interest rate risk for banks. We will discuss what makes up interest rate risk, as well as how interest rate risk can be measured and managed. We will also discuss accounting options for hedging programs, as well as best practices to consider when implementing and managing a hedging program for interest rate risk.

Interest rate risk is a reality for financial institutions such as banks. The typical business model for banks is to fund long-term fixed-rate assets (loans customers) with short-term liabilities (deposits from customers). This duration mismatch introduces interest rate risk that, if not properly managed, can negatively impact earnings. In extreme cases it can result in an institutional failure. This topic is especially relevant today as we leave behind a prolonged environment of low interest rates, and enter a period of steadily rising interest rates - in particular short-term interest rates. As evidence of this, below is a snapshot of 2-year and 10-year Treasury yields, and how they have changed in just one-year.



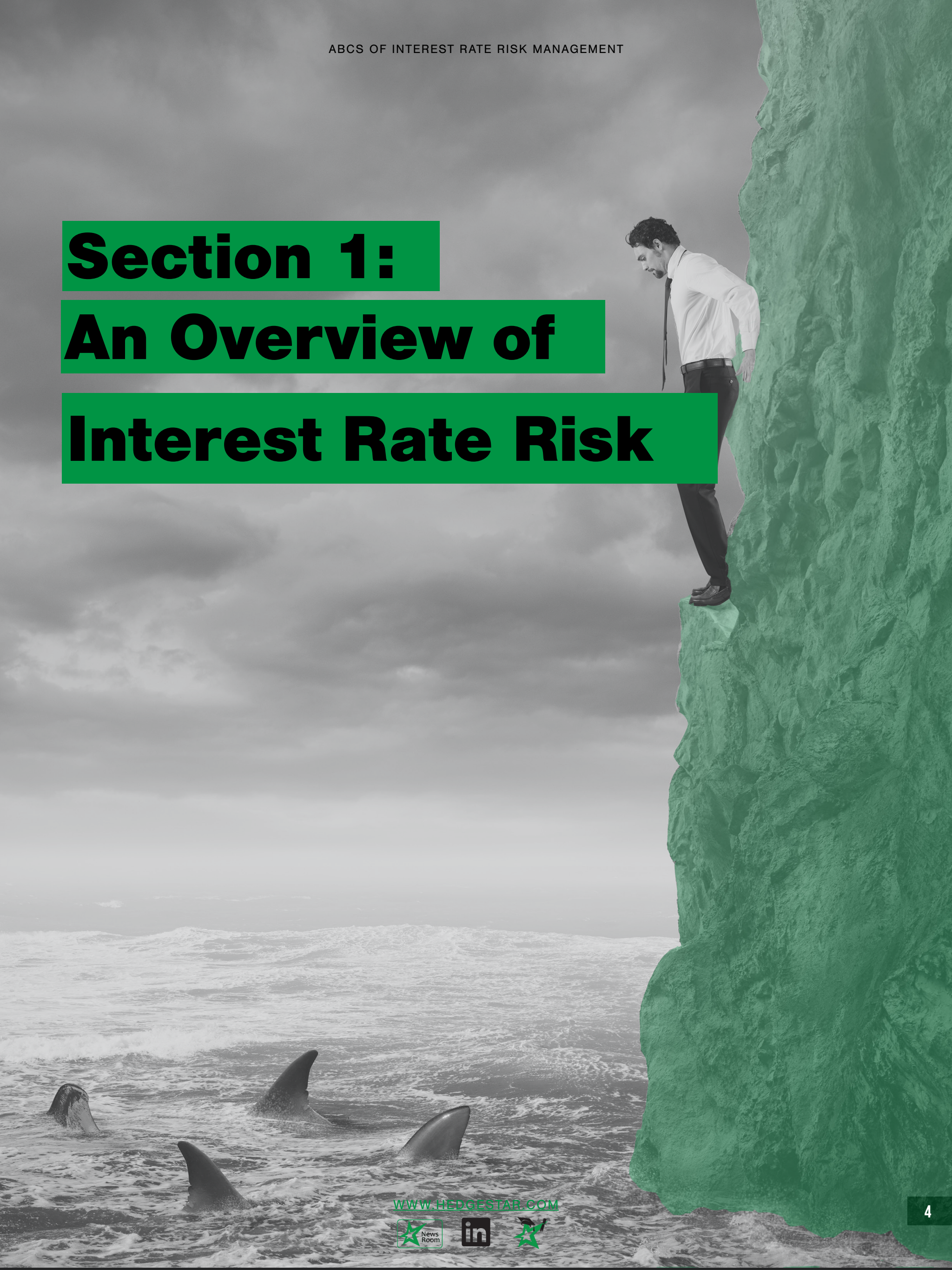
Think of interest rate risk as the blood pressure for your institution. It can increase and decrease without obvious warning signs. If not properly managed, it can harm your institution – or cause it to fail. In this e-book you will learn that there are methods for recognizing, measuring and managing your institution's blood pressure – it's interest rate risk management.

For the past eight years we have been in an economic cycle of growth and low interest rates. We know that the economy is cyclical – that it will revert. Every recession in US history has been preceded by an inverted yield curve (this is when the 2-year Treasury yield is higher than the 10-year Treasury yield.) As shown in Table 1, in just one-year we have seen the spread in 2-year and 10-year treasuries decrease from 1.04% to 0.44%. There is no telling if, or when, the yield curve will invert. However, it will be the prudent institution that takes the necessary steps to protect itself from this possibility, as well as other forms of interest rate risk that we will discuss.

This e-book is intended to be an overview of managing interest rate risk – an A,B,C's on the topic. You will be able to find articles and white papers on many of the topics at www.hedgestar.com that will go into greater detail than what the scope of this e-book allows.

Lastly, managing interest rate risk is complex. It requires training, analytical tools, data and trusted experts outside of your organization. This e-book should not be viewed as a replacement to any of these items.

Section 1: An Overview of Interest Rate Risk



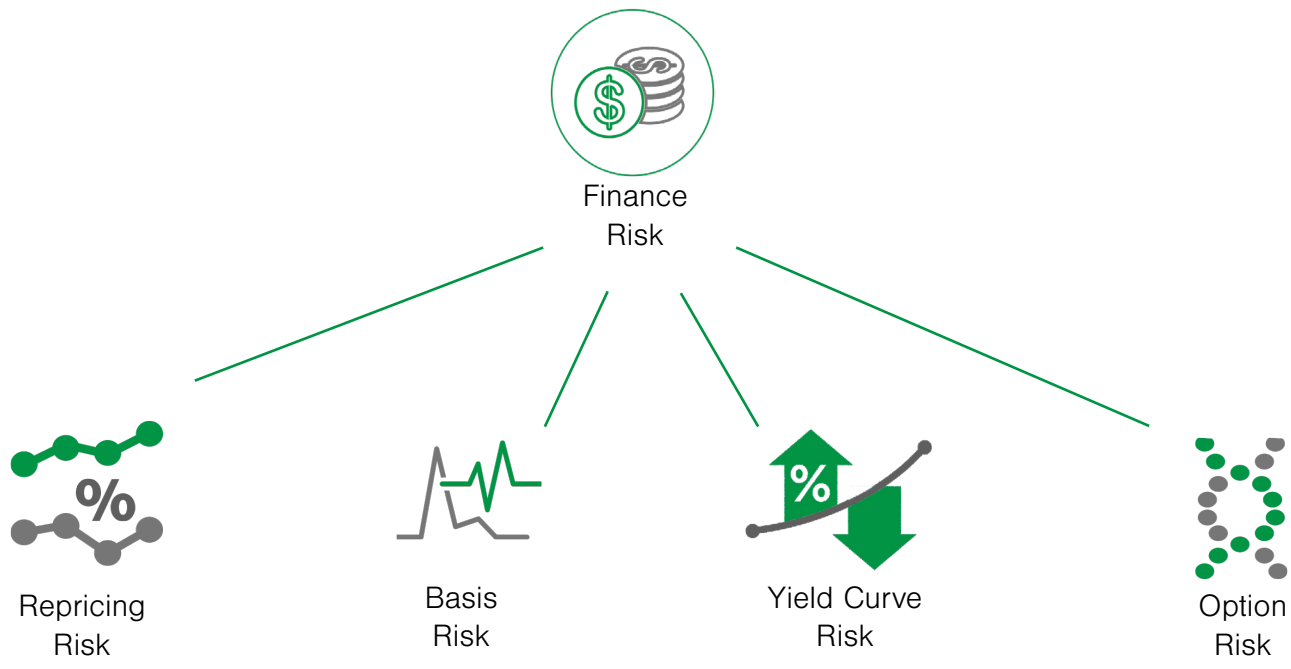
CHAPTER 01

What is interest rate risk?

For all organizations, risks exist in many forms. For an organization to survive and succeed, it is critical for an organization to understand and manage the risks to which it is exposed. This practice is commonly referred to as enterprise risk management, and includes the following types of risk:

Each of these risks is nuanced and complex, and deserving of its own discussion. Organizations with robust enterprise risk management programs will identify the specific risks it is exposed to, and develop strategies to manage each risk. Within each category of risk are individual components that make up that category. We will be focusing on interest rate risk which is a component of finance risk, and a significant risk that should be actively managed by banks.

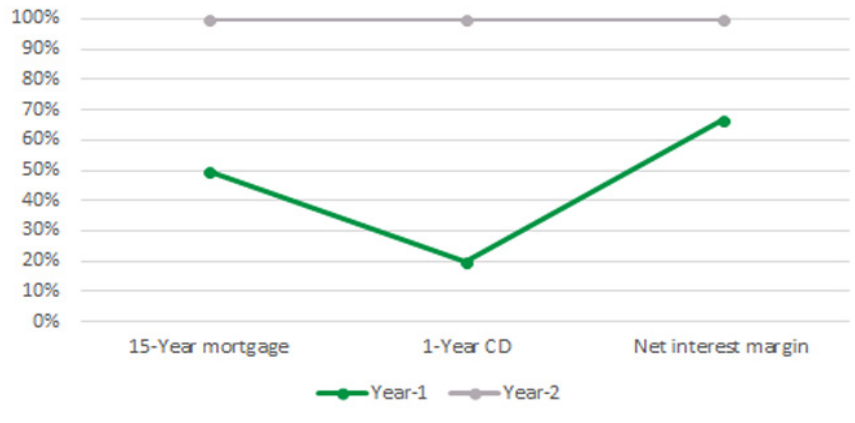
Interest rate risk can be broken-down into four components of risk:



Repricing Risk

Repricing risk results from timing differences in rate changes of bank assets, liabilities, and off-balance sheet ("OBS") instruments. For fixed-rate assets, liabilities and OBS instruments the timing difference arises at maturity, when a replacement instrument would be contemplated. For floating-rate assets, liabilities and OBS instruments, the timing difference arises from repricing. As interest rates change, repricing mismatches will expose your institution's income, and economic value, to unexpected volatility.

A common example of repricing risk occurs when a portfolio of long-term, fixed-rate loans is funded with short-term deposits. Below is a year-over-year example of this risk:

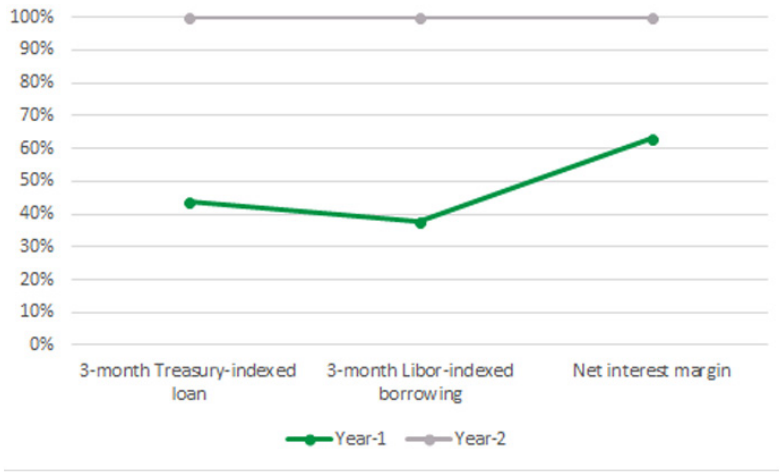


In this example, the yield on the asset, being a long-term asset, is unchanged. However, the net interest margin – a summary profitability measure – narrows. This effect is typical of any institution, in an increasing interest rate environment, that follows the practice of funding long-term assets with short-term liabilities.

Basis Risk

Basis risk arises when instruments with different indices, but otherwise similar characteristics, do not move in unison. Differences in rate changes from index to index will cause changes in cash flows that will impact the earnings spread between assets, liabilities and OBS instruments.

For example, assume you fund loans that are based on 3-month treasury rates with deposits that are based on 3-month Libor. To the extent rates change unevenly, you could experience the following:

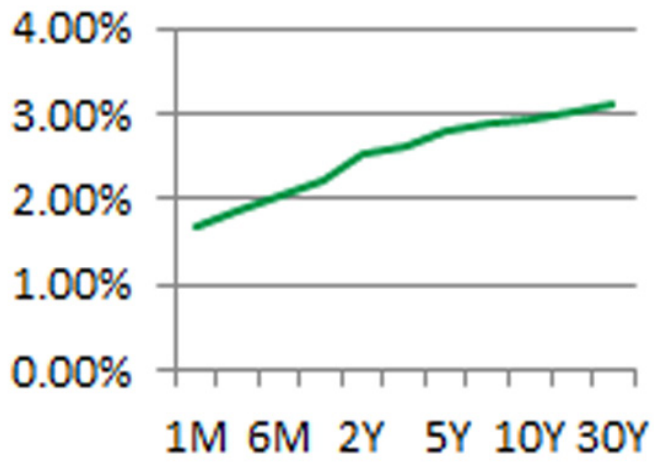


When variable-rate loans are issued with a particular index, and funded with liabilities that apply a different index, some basis variance should be expected. The most common indices used by banks are Libor, Treasury and Prime. While historical correlation will not predict future correlation, some historical perspective will likely help form some expectation on how the indices can be expected to track. If you would like to view the historical correlation of daily rates for 3-month LIBOR, 3-month Treasury and Federal Funds rates dating back to 1990, it can be found here.

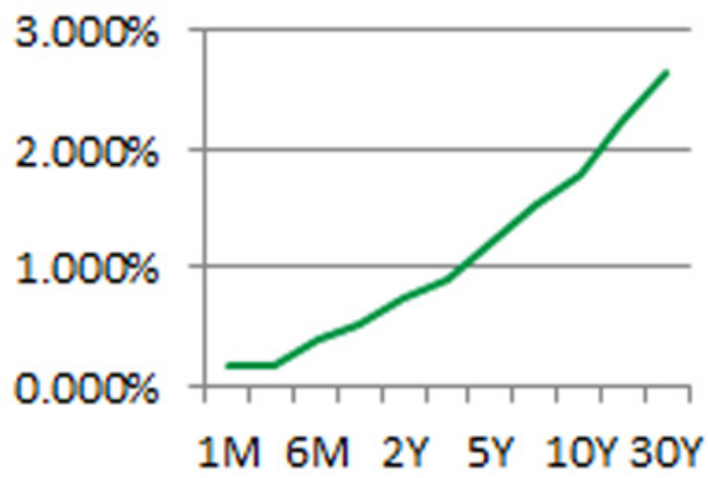
Yield Curve Risk

Yield curve risk results from non-parallel changes in the yield curve. A typical yield curve plots bond yields ranging from one-month to 30-years. Market changes rarely cause each point on the yield curve to shift up or down in unison. The shape of the yield curve will consistently change due to changing relationships between interest rates for different maturities. A visual example of a yield curve shift over time is shown below. The three graphs show the yield curve on the following three days - 5/4/2016, 5/4/2017 and 5/4/2018. These graphs show a year-over-year "flattening" of the yield curve. The yield curve becomes "flat" as the spread between long-term and short-term rates narrows, or becomes smaller.

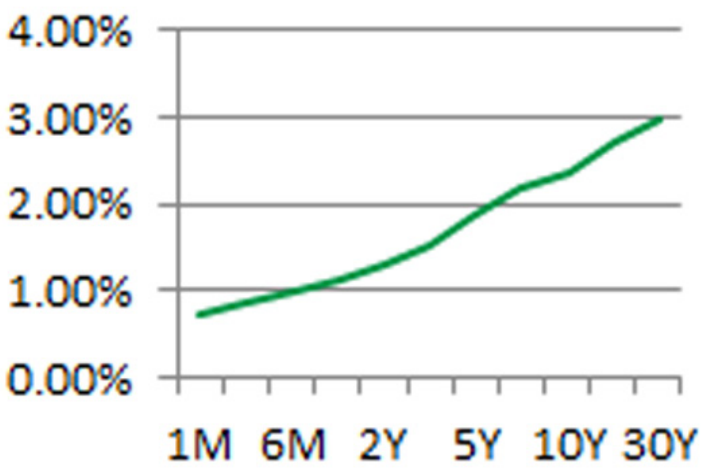
May 4, 2018
Treasury Yield Curve



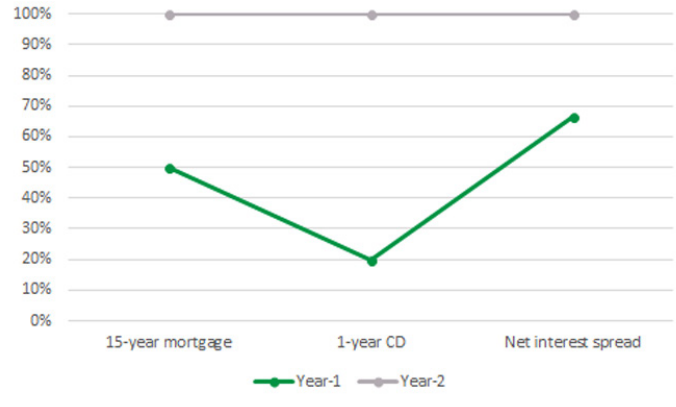
May 4, 2016
Treasury Yield Curve



2017
Treasury Yield Curve



To view a yield curve shift's impact on net interest margin, you can reference the example below. In this example, short-term rates rise faster than long-term rates (as is what is occurring year-over-year in the above graphs). This impacts the profitability of funding long-term assets with short-term liabilities.



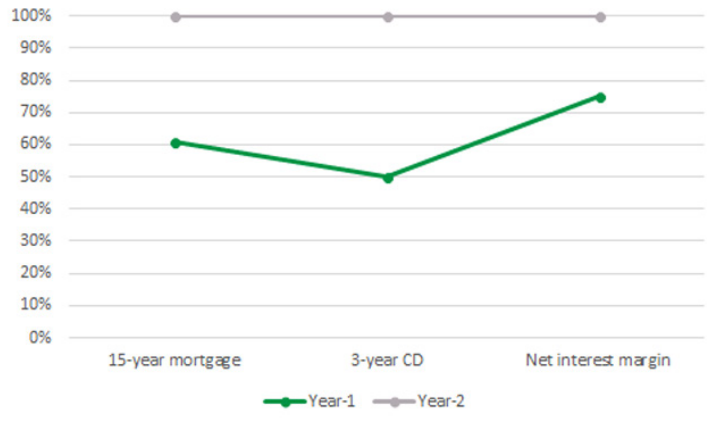
As you see in the above examples, a flattening yield curve introduces yield curve risk that will impact your institution's income. As with basis risk, it is helpful for you to have a historical perspective of the yield curve. A historical perspective doesn't necessarily predict how the yield curve will change in the future – but it can be one of several things to consider when assessing yield curve risk. To provide a historical perspective on Treasury yields, you can view the 2-year and 10-year US Treasury rates back to 1990 by clicking here.

Option Risk

The fourth and final risk that is inherent in interest rate risk is option risk. Options are embedded in many of the assets and liabilities of banks. Common forms of options include:

- Bonds and notes with call or put provisions
- Loans that give borrowers the right to prepay balances
- Non-maturity deposits that give depositors the right to withdraw funds at any time

Below is an example of the impact on income in an environment of decreasing interest rates. In the example, a customer or member refinances their mortgage in year-2.



Option risk was introduced into this example from a lowering rate environment which incented a mortgage refinancing.

CHAPTER 02

Measuring Interest Rate Risk

To manage interest rate risk effectively at a bank, institutions need timely and accurate information on how changes in interest rates will impact their balance sheet and income statement. The activity of hedging is pointless without an understanding of the quantity of risk.

The sophistication of your institution's interest rate risk strategies should be commensurate with your level of risk exposure, as well as the complexity of your holdings and activities. In addition, depending on the interest rate risk management experience that resides in your institution, consideration should be given to whether this function should be done internally, or outsourced to an ALM professional. It is not uncommon for banks to outsource a portion, or all, of their asset and liability management (ALM) functions to a company that specializes in this service.

There are generally three types of measurement tools that are the foundation of interest rate risk analysis, and which provide the starting point for determining your hedging needs. A discussion of the three tools follows below.

Gap Analysis Models

Economic Value of Equity / Net Economic Value models

Net Interest Income Simulation Models

Gap Analysis Models

Gap analysis measures the difference between the amount of rate-sensitive assets and rate-sensitive liabilities that collectively will reprice during a specific timeframe in the future. Depending on your view on the direction of interest rates, the results of the gap analysis will dictate if you should expect positive or negative impact on net income from the rate-sensitive assets and rate-sensitive liabilities that are included in the gap analysis. The table below summarizes the net income effect for the various assumptions and outcomes of the gap analysis. In the table o the right, RSA and RSL refers to rate sensitive assets, and rate sensitive liabilities, respectively.

Gap analysis can help you recognize the timeframe and impact of repricing. However, it has limitations. It cannot measure the effect of imbedded options, the effect of non-linear yield shifts, or basis risk. Depending on the complexity of your activities and holdings it may, and in all likelihood will, be necessary to incorporate additional measurement tools.

Results of gap analysis	Assumed rate direction	Effect on net income
RSA > RSL	Higher	Positive
RSA < RSL	Higher	Negative
RSA > RSL	Lower	Negative
RSA < RSL	Lower	Positive

RSA = rate sensitive assets
RSL = rate sensitive liabilities

Economic Value of Equity / Net Economic Value Models

Economic value of equity (EVE) and net economic value (NEV) models reflect the net present value of an institution's assets, liabilities, and off-balance sheet cash flows. Both models are essentially the same, and in terms of a formula, are represented as:

EVE and NEV can be used to measure an institution's long-term interest rate risk by capturing the impact of changes in interest rates on future cash flows through interest rate stress tests.

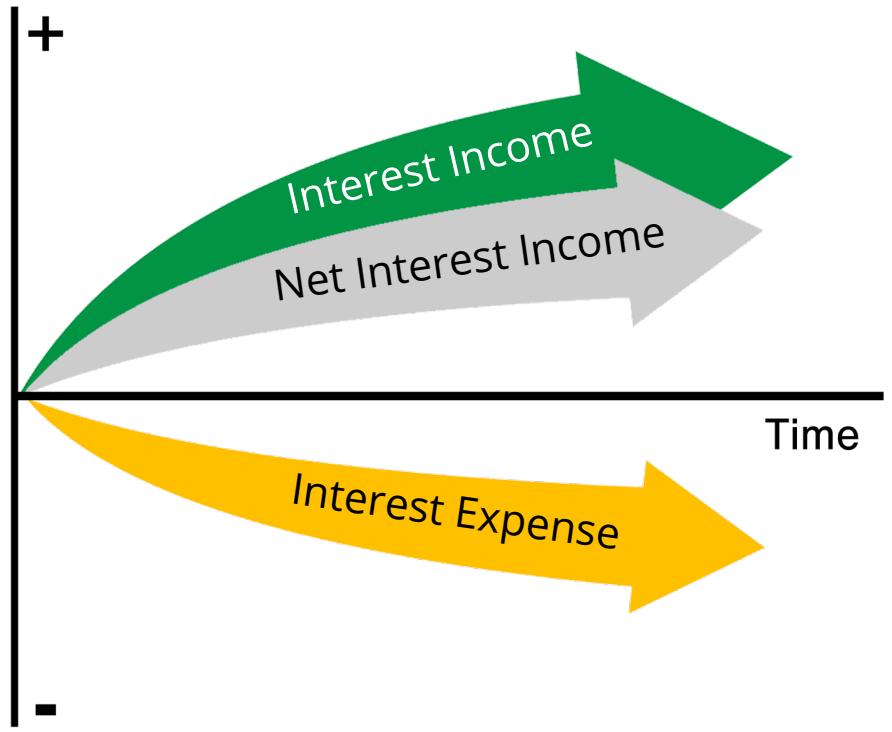
EVE and NEV models range from basic to complex, depending on the assumptions used to derive results. The most basic models use rate and cash flow assumptions that are relatively easy to create and understand. These work well for institutions with less complex balance sheets. Institutions with more complex balance sheets need to rely on more sophisticated models.

There are certain limitations in these models. Cash flows are difficult to quantify for deposits and other financial instruments that do not have a defined maturity. This creates uncertainty with respect to duration and cash flows. These models are often not effective at valuing embedded options, and generally should not be used to assess more complex instruments. However, these models are a key interest rate risk tool that allows institutions to prepare for changing interest rate environments.

Net Interest Income Simulation Models

Net interest income simulation models measure the effect that interest rate changes will have on net interest income. If properly calibrated, this model will capture the four types of interest rate risk that were discussed earlier. Net interest income is defined as interest income minus interest expense. In the model, a baseline of the balance sheet is established. The baseline is the balance sheet's performance in a static interest rate environment. The balance sheet is then subjected to different interest rate scenarios (stress test and shock scenarios) and compared to the baseline. A higher variance in these results reflects higher interest rate risk in the balance sheet.

This model shows the potential effects on net interest income and is regarded by some as having more utility than other models. But like all models, its effectiveness relies on input assumptions. It is possible to put overly optimistic assumptions into the model, skewing the output. Managers who review these models should understand the rationale behind assumptions and changes made to the model.



Interest Rate Shock and Stress Tests

A component to any method of interest rate risk measurement is to conduct interest rate shock and stress tests to assess your institution's vulnerability to exceptional, but plausible events. A common test is to apply a shift of 200 basis points in the yield curve, up and down, and evaluate the shift's impact on your institution's net interest margin. Examples for more robust testing are detailed in the Basel Committee's *Standard on Interest Rate Risk in the Banking Book*. In it they list six interest rate shock scenarios:

1. Parallel shock up
2. Parallel shock down
3. Steepener shock (short rates down and long rates up)
4. Flattener shock (short rates up and long rates down)
5. Short rates shock up
6. Short rates shock down

The complexity of your institution's holdings and activities will dictate the sophistication of interest rate risk measurement that will best serve your institution.

Section 2: Strategies for Managing Interest Rate Risk

CHAPTER 03

Hedging

Now that you understand the four types of risks that exist in interest rate risk, as well as some techniques to measure interest rate risk, we will discuss hedging. In this section, the discussion on hedging will be in broad terms to help you better understand what hedging is - and isn't. Additionally, we will provide specific examples of hedging for interest rate risk commonly experienced by banks.

At its core, a hedge is a mechanism that protects your institution's finances from risk. A hedge is done to minimize the possibility that your assets will lose value, or that expected cash flows will be less than expected. Consider it a form of insurance. As a homeowner, you know the importance of purchasing insurance for your home to protect you from an unexpected event, such as a fire. Putting a hedge in place to protect your institution from a harmful financial event is no different. No prudent person would consider exposing an asset, such as a home, to unknown events such as a fire. The same should hold true for banks. Not taking steps to insure your institution against adverse changes in interest rate risk exposes your institution to unnecessary risk and excessive capital requirements.

Many institutions have become complacent when it comes to managing interest rate risk. In part, this is driven by the extended low-rate environment we have been in. As of this writing, the yield on the 2-year Treasury note is 2.49%. The last time the yield on the 2-year Treasury note exceeded this level was August 11, 2008 when the yield was 2.56%. However, taking the stance that the status quo has been "working fine" can be dangerous. No bank is immune to interest rate risk – and the perils that can come from it.

Savings and Loan Crisis

The savings and loan (S&L) crisis of the 1980s saw more than 1,000 S&L institutions collapse, costing the U.S. government more than $100 billion. While there are many factors culpable for the cause of the S&L crisis, two contributing factors were a rising interest rate environment – and a lack of planning for this risk by institutions that largely held long-term assets and short-term liabilities. In the 1980s, the S&L institutions did not protect their net interest margins. Beginning in the late 1970s, inflation reached an exceptionally high level pushing interest rates higher. With fixed-rate mortgages funded by short-term deposits, as interest rates increased, the amount they had to pay on the short-term deposits eventually exceeded what they earned from their long-term fixed-rate mortgage portfolio. In essence, the S&L institutions were paying their customers to borrow money. This was the start of the S&L crisis – and it could have been avoided through proper hedging.

Banca dei Paschi di Siena ("BMPS")

BMPS is an Italian bank that was founded in 1624. It is the world's second oldest bank and the fourth largest Italian bank. In the early 2000s, as interest rates started to increase, BMPS began to lose significant income. BMPS survived numerous recessions, two world wars, and numerous other challenges. Lacking adequate risk measures, BMPS didn't survive the 2008 financial crisis. They lost 99% of their enterprise value, and they were forced into recapitalization.

An important distinction that should be understood is that hedging is not speculation. When people are first introduced to hedging with financial products such as swaps or futures, some will mistake this activity as speculation. When hedging, you are not guessing on the direction of interest rates. Instead, you are mitigating the risk of loss should interest rates move in a direction that negatively impacts your institution's net asset margin. Not hedging a risk can be considered speculation. If you decide to not hedge an exposure to increases in interest rates, you're in effect speculating that interest rates will not increase.

Speculators take positions in assets with the expectation that the asset will change in value in a way that will be profitable to the speculator. Speculators should not be viewed negatively. Their deliberate risk appetite plays a critical role in providing liquidity in the market for all participants, including hedgers.

When considering interest rates, the four key differences between hedging and speculation are the following:

1. Hedging is for preventing a pre-existing risk, due to changing interest rates, from impacting the firm's earnings. Speculation is "betting" on the direction interest rates will move and trading some associated instrument with the hope of earnings profits.

2. Hedging is a means to manage the volatility of interest rates. Speculation depends on volatility of interest rates, and trades in and out of underlying assets whose value is impacted by the movement of rates.

3. Hedging offers protection against undesired fluctuation of values. Speculation incurs risk to generate profits from changes in values.

4. Hedgers are risk adverse – they secure their income through hedging. Speculators are risk takers – they take risks deliberately with the hope to earn profits.

Hedging has long been an integral part of operations for many institutions, including banks. Evidence of this can be seen by the size of the over-the-counter (OTC) derivatives market. OTC traded derivative contracts are derivatives that are traded directly between two parties, without going through an exchange. OTC derivatives compromise the following categories:

- Interest rate derivatives
- Foreign currency derivatives
- Credit derivatives
- Equity-linked derivatives
- Commodity derivatives

Products such as interest rate swaps, currency swaps and credit default swaps are almost always traded OTC. As of June 30, 2017, the notional amount of outstanding OTC derivative contracts was in excess of $540 trillion, with a market value of approximately $13 trillion. For the definition of notional value, market value and other terms relevant to derivatives you can go to our Glossary of Terms. The approximate notional amounts of all OTC derivatives are as follows:

OTC Derivative	Outstanding Notional (6/30/17)
Interest rate derivatives	$415.914 trillion
Foreign exchange derivatives	$76.980 trillion
Credit derivatives	$9.868 trillion
Equity-linked derivatives	$6.836 trillion
Commodity derivatives	$1.401 trillion
Other / unallocated	$31.437 trillion

As you can see, interest rate derivatives represent the largest segment of the OTC derivatives market at over 75% of the total market. This high volume of activity can be attributed to the fact that interest rate risk exists in all segments of the economy. Most entities, large or small, for-profit or non-profit, have some exposure to changes in interest rates. The same cannot be said about exposure to foreign currency volatility, commodity prices, or exposure to different credits and/or equities. While some entities do have exposure to some or all of these segments, whether cash-rich or cash-poor, virtually all entities have exposure to interest rate volatility – thus explaining its prominence of this sector in the OTC derivative market.

Hedging Tools

Various hedging tools and strategies are available to banks. Those that are most relevant for this e-book are natural hedges and interest rate swaps which are explained in Chapters 4 and 5, respectively. Other tools and that are used less frequently are listed below with a brief description.

Interest rate option and future – Options and futures are exchange traded derivatives. An interest rate future is an agreement to buy or sell an interest bearing instrument at a future date and at a specified price. An interest rate option provides an option (with no obligation) to buy or sell an interest bearing instrument at a future date and at a specified price.

To-Be-Announced (TBA) mortgage-backed security – The TBA market was created to provide liquidity for mortgage lending. TBAs are forward mortgage-backed securities (MBS) instruments. They are pass-through securities issued by Freddie Mac, Fannie Mae or Ginnie Mae. When an MBS investor buys a TBA, they purchase a security backed by a pool of loans in an institution's pipeline. Financial institutions short TBA MBS to hedge their mortgage pipeline. In terms of hedging a mortgage pipeline, to short a TBA means to be in a position where the volume of your TBA, (hedge), exceeds the volume of your open loan, or long, position.

Interest rate swaption – An interest rate swaption gives you the right (with no obligation) to enter into an interest rate swap at a predetermined interest rate and future date.

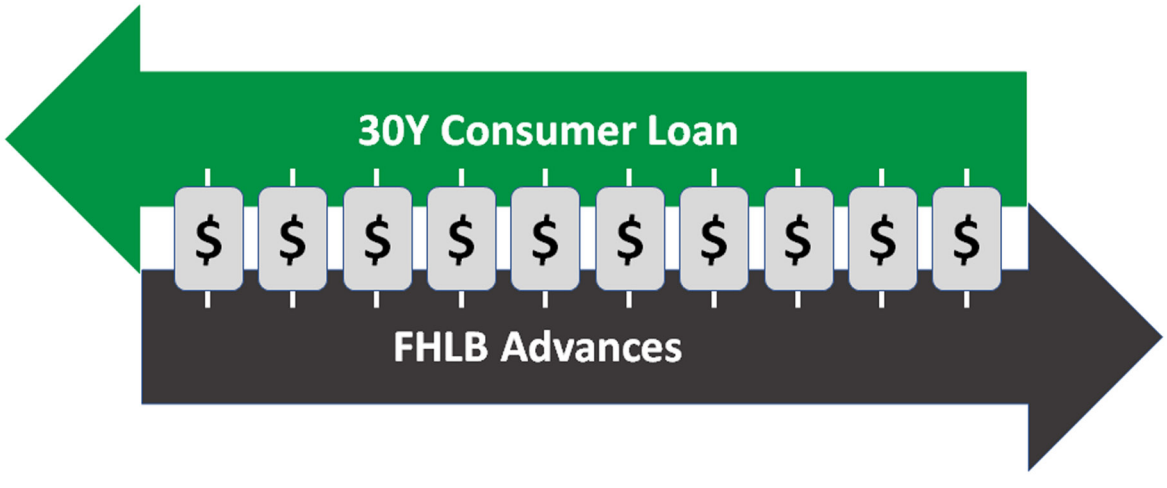
Natural Hedges

CHAPTER 04

When we say natural hedges, we are talking about opportunities in your balance sheet to naturally hedge interest rate risk, rather than using derivatives. Matching and smoothing is a hedging strategy where you identify natural hedging opportunities in your balance sheet. Banks will often attempt to match and smooth the interest rates and maturities of their assets and liabilities to avoid potentially harmful mismatches. However, this is challenging due to the competing interests of your customers. To meet this demand, as well as execute your business strategy, you make loans, take deposits, and purchase securities – most with different maturities and interest rates. This exposes your institution to the various forms of interest rate risk.

You can attempt to naturally hedge this exposure through the mix of loans, deposits and securities that you hold. However, this is challenging as you are limited to market demand and availability. You may be able to hedge a portion of your balance sheet through natural hedges. However, to the extent it is determined that your organization still has excessive exposure to interest rates, you may need to look to derivatives for hedging. The following chapters discuss the financial derivatives most commonly used for hedging interest rates.

Below is a diagram that visually depicts a natural hedge where cash flows from FHLB advances align with a long-term asset, such as 30-year consumer loans in this example.

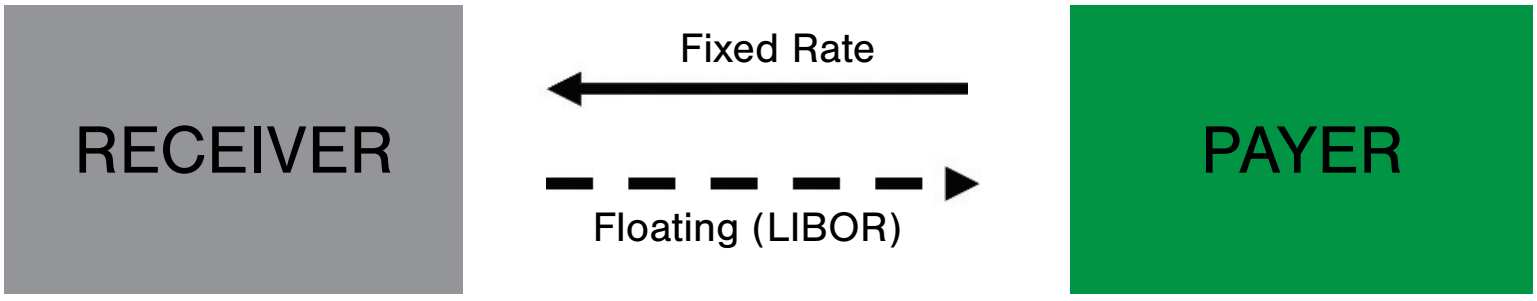


CHAPTER 05

Interest Rate Swaps

One of the most common derivatives used for hedging interest rate risk is an interest rate swap. As discussed in section 1, interest rate derivatives represent a massive market with over $400 trillion notional amount outstanding. Interest rate swaps are a significant portion of that total outstanding amount.

The most common - and liquid - type of interest rate swap is a “plain vanilla” interest rate swap. In this swap, two parties enter into a contract where they agree to exchange fixed payments for floating payments linked to London Interbank Offered Rate (LIBOR). Below is a diagram of a plain vanilla interest rate swap.



Swaps can be traded over-the-counter (OTC) or on an exchange, with the vast majority being traded OTC. OTC simply means that the contract is between two parties – a swap dealer and the hedger - with no intermediary such as an exchange.

In a swap, the floating rate can be linked to one of several interest rates. The most common are shown below, with LIBOR being the most widely used:

- LIBOR
- Treasuries
- Fed Funds

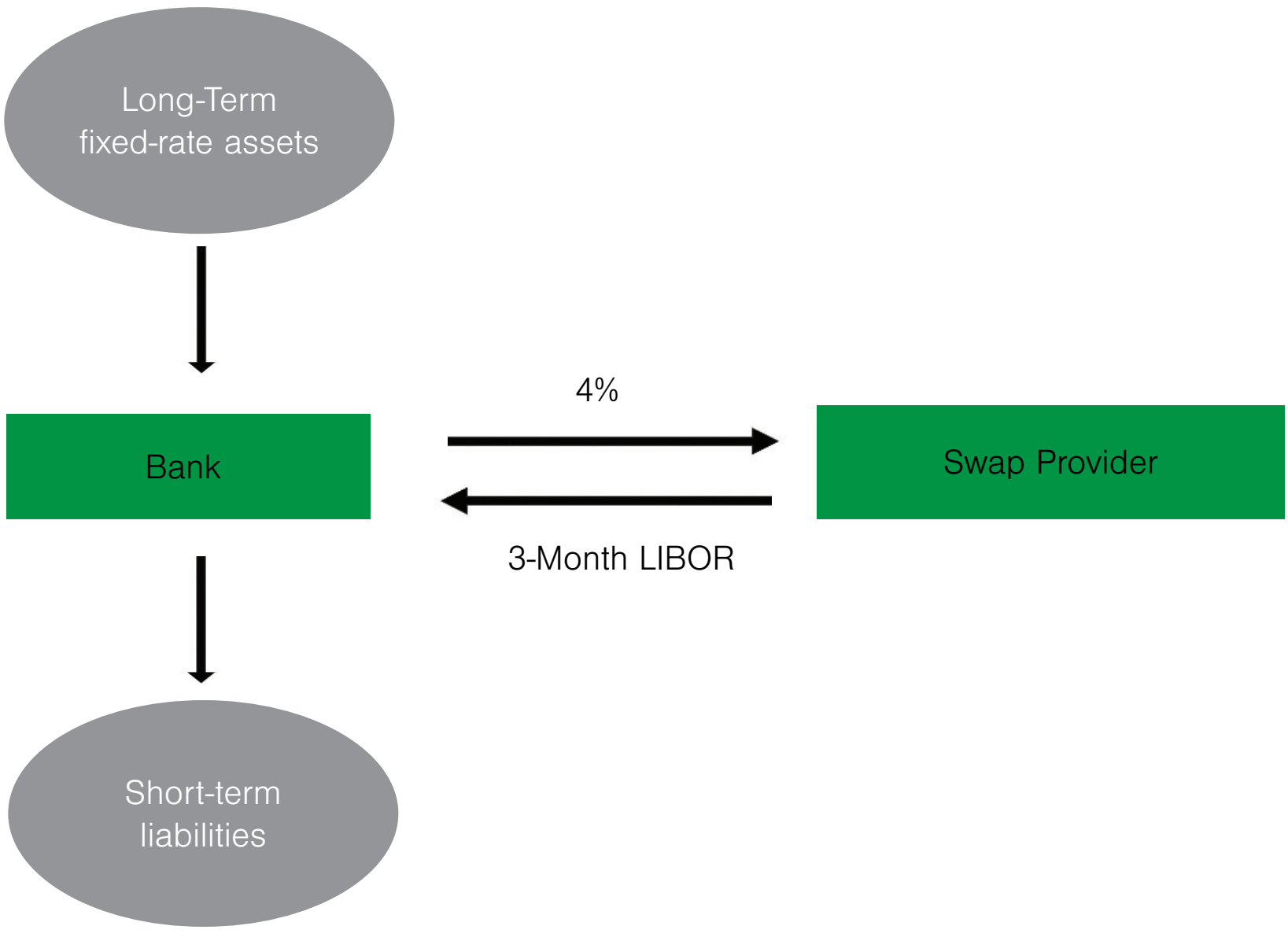
The fixed rate is referred to as the *swap rate*. It is the fixed rate that the receiver requires in exchange for the uncertainty of paying a floating rate. At any given time, the market’s forecast of what LIBOR will be in the future is reflected in the forward LIBOR curve.

The amount, or size, of the swap is referred to as the *notional amount*. This amount is the predetermined dollar amount used in the calculation to determine the respective payment amounts. The notional amount never changes hands in the swap transaction, which is why it is considered notional, or theoretical. Only the swap fixed and floating settlement payments are exchanged. The payments are typically scheduled to occur simultaneously, and are netted from each other – resulting in one net-payment per period.

Commercial and investment banks with strong credit ratings are swap market-makers, offering both fixed and floating-rate cash flows to their customers. They are often referred to as the swap dealer. After the swap dealer executes a swap with its customer, it may offset its exposure by entering into another, offsetting position in the futures market, or with another inter-dealer broker. The significance in this process is that the swap dealer isn't necessarily making a "bet" against your view of interest rates. The dealer is simply providing a service for transactional revenue.

Interest Rate Swap Example

As described earlier, long-term fixed-rate assets such as mortgages are often funded with short-term liabilities. Firms with this profile experience an earnings' squeeze when rates go up, because their cost of borrowing rises faster than the yield on their assets. To hedge this risk, you can effectively "lengthen the maturity" on your funding with an interest rate swap. This will have the effect of better matching your funding costs to the yield you receive from your long-term fixed-rate assets. Below is a diagram of an interest rate swap that achieves this outcome.



Advantages of Interest Rate Swaps

- Effective risk management tool – As long as you understand your interest rate exposure and the risk you want to manage, interest rate swaps can be an effective tool for managing interest rate risk.
- Flexibility – The terms and structures that can be built into a swap are numerous. They can be arranged for any period of time with flexibility on the underlying rate index. They can include optionality, and they can be structured to provide liquidity if that is desired.
- Liquidity – Plain vanilla swaps – swaps having standard terms and referencing a transparent market index are highly liquid. When entering into a plain vanilla swap, its price transparency gives comfort that you are receiving a fair price. Also, you can terminate an interest rate swap any time. However, when terminating a swap prior to its maturity, you would be doing so at a value reflective of the current market. Such an early termination will result in either receiving a payment from, or making a payment to, the swap dealer.

Disadvantages of Interest Rate Swaps

- Legal documentation – Several documents are required with interest rate swaps. Depending on your comfort level with the terms of each of the documents, you may need to retain counsel or an advisor that specializes in swaps to assist with the document review and negotiation.
- Counterparty credit risk – Earlier we explained that the majority of interest rate swaps are traded over-the-counter, which simply means that the swap is a contract between your institution and a swap dealer. That being the case, you are exposed to the creditworthiness of the dealer. This risk can be mitigated through collateral requirements. Event driven requirements that can cause the swap provider to post collateral include – 1) credit rating downgrades of the dealer, or 2) the fair value on the interest rate swap becomes negative beyond a certain threshold amount.
- Collateral requirements – Similar to how you negotiate to protect your institution from an adverse credit event of the dealer, the dealer will do the same with respect to credit exposure to your institution. The credit support annex, described in Chapter 7 of this e-book, dictates the collateral requirements. It generally requires you to post collateral in the event the fair value of the swap drops below a certain threshold amount, or if you experience a significant negative credit event such as a rating downgrade.

CHAPTER 06

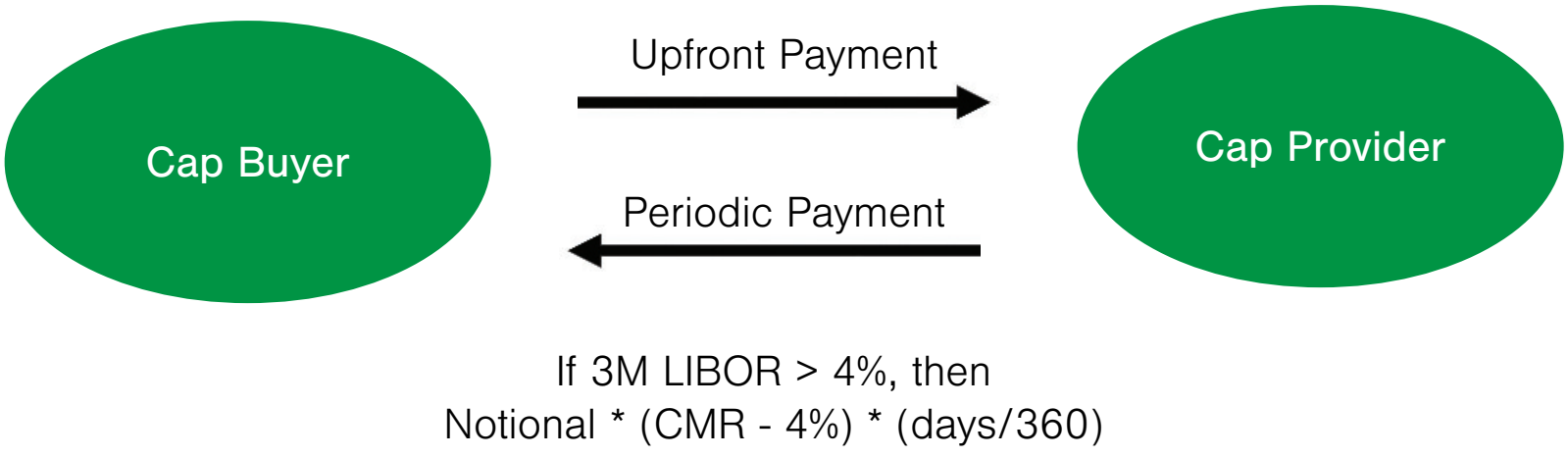
Interest Rate Caps

Like interest rate swaps, interest rate caps are designed to hedge cash flows over a defined period of time. They are structured as medium- to long-term agreements and can be an effective tool for managing interest rate risk.

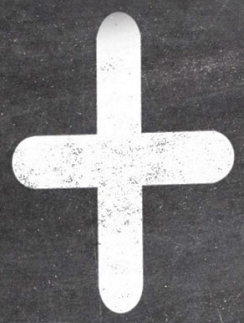
Interest Rate Cap

An interest rate cap, sometimes referred to as a “ceiling”, is structured to hedge against increasing interest rates, and is typically utilized by borrowers to protect variable rate debt payments from exceeding a specified level (the “strike rate”). It is an agreement between your institution and an interest rate cap dealer. Under a typical cap transaction, the purchaser of the cap is protected against rises in interest rates above the strike rate, in return for an up-front premium. A diagram of a cap with a 4% strike rate is shown below.

Note that in the diagram, CMR is current market rate and *days* is the number of days in the accrual period applicable to the interest payments.



In the example above, the cap buyer pays an initial cap premium at the inception of the trade and then, if 3-month LIBOR exceeds the strike rate (also referred to as the strike price) of 4%, the cap provider will make payments to the cap buyer sufficient to bring the buyer’s net effective rate down to 4% (assuming the buyer is paying CMR on its hedged debt payments). On the other hand, if 3-month LIBOR remains below 4%, no payments would be made under the cap and the buyer would only bear the cost of the current market rate on the hedged transactions.



Advantages of Interest Rate Caps

Effective risk management tool – As long as you understand your interest rate exposure and the risk you want to manage, interest rate caps can be effective tools for managing interest rate risk, particularly in volatile markets where an institution faces great uncertainty surrounding future possible rate scenarios.

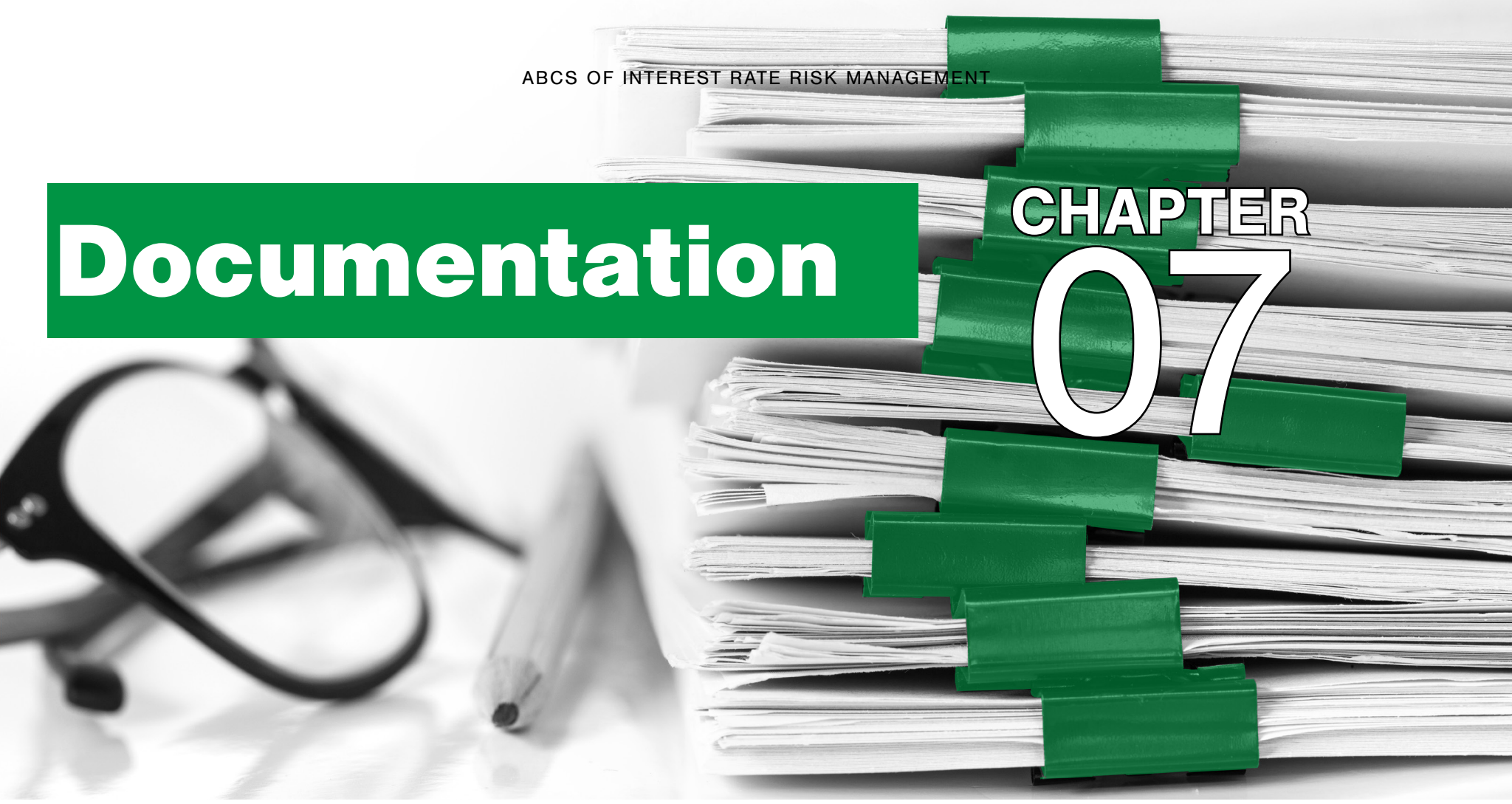
No need to post collateral - regardless of the future value of the cap. You will never need to post collateral.

Easy to explain– An interest rate cap is a concept that is relevant to retail financial products, making it more likely to be familiar with potential users.

Disadvantages of Interest Rate Caps, Floors and Collars

Up-front premium – Your institution will be required to provide payment at inception to enter into a cap.

Credit exposure to the provider - when the cap value is an asset to your organization, you will have credit exposure to the cap provider. However, this can be minimized by requiring the provider to post collateral when the cap value is positive to your organization.



Documentation

CHAPTER 07

Interest rate swaps and caps are subject to the same documentation. Depending on the structure and terms of the derivative, it will have some or all of the documentation listed below. After the list is a description of each document.

- ISDA Master Agreement
- Schedule
- Credit Support Annex
- Confirmation

ISDA Master Agreement – The International Swaps and Derivatives Association, Inc. (ISDA) is the global trade association for the derivatives industry. The ISDA master agreement is the standard governing document used throughout the industry that serves as a framework for all over-the-counter derivative transactions, including interest rate swaps and caps. This is a standardized form that cannot be changed. Any negotiated changes to the ISDA master agreement are reflected in the schedule.

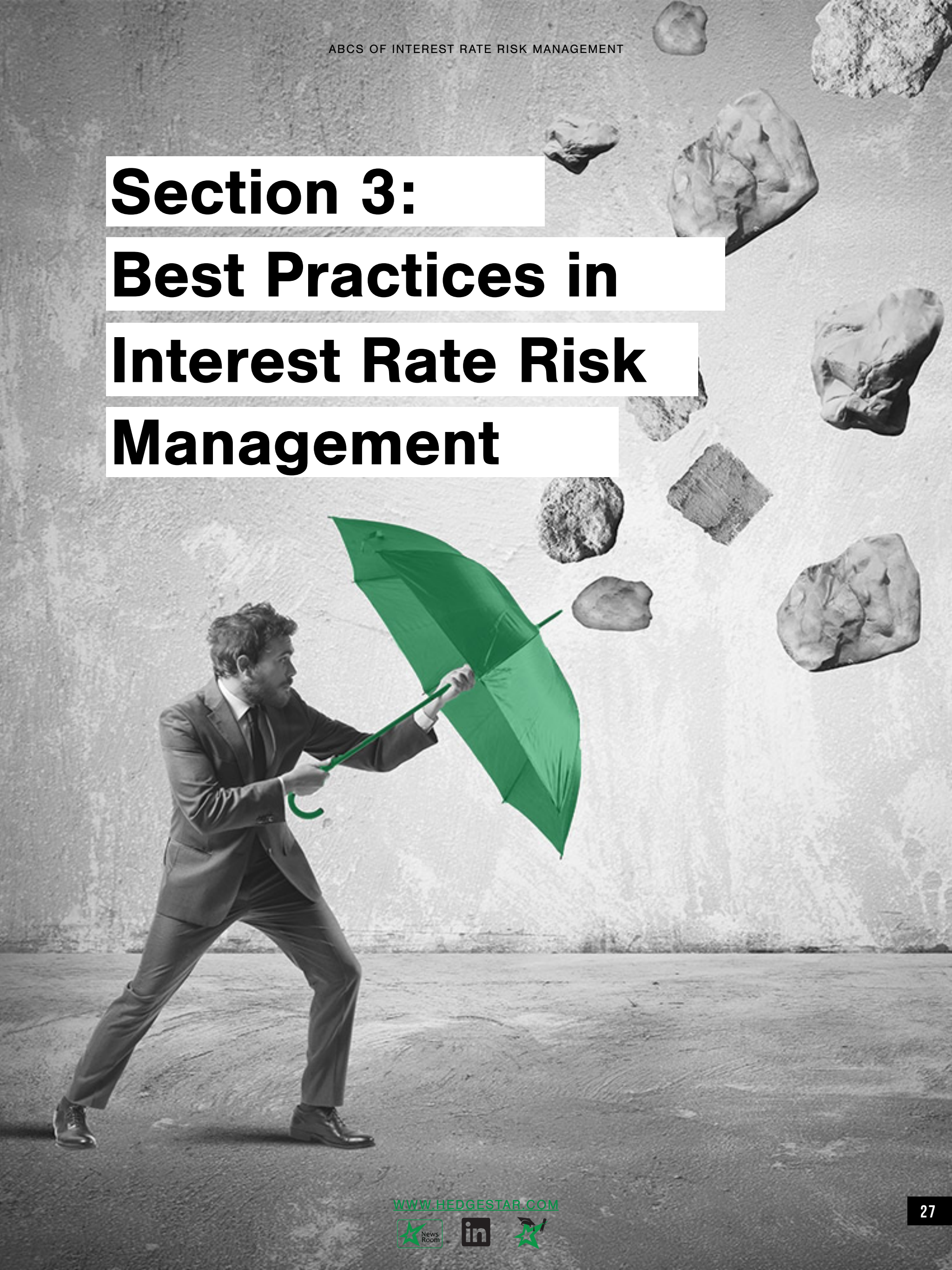
Schedule – The schedule supplements the ISDA master agreement. It contains any changes, or negotiated items, to the ISDA master agreement.

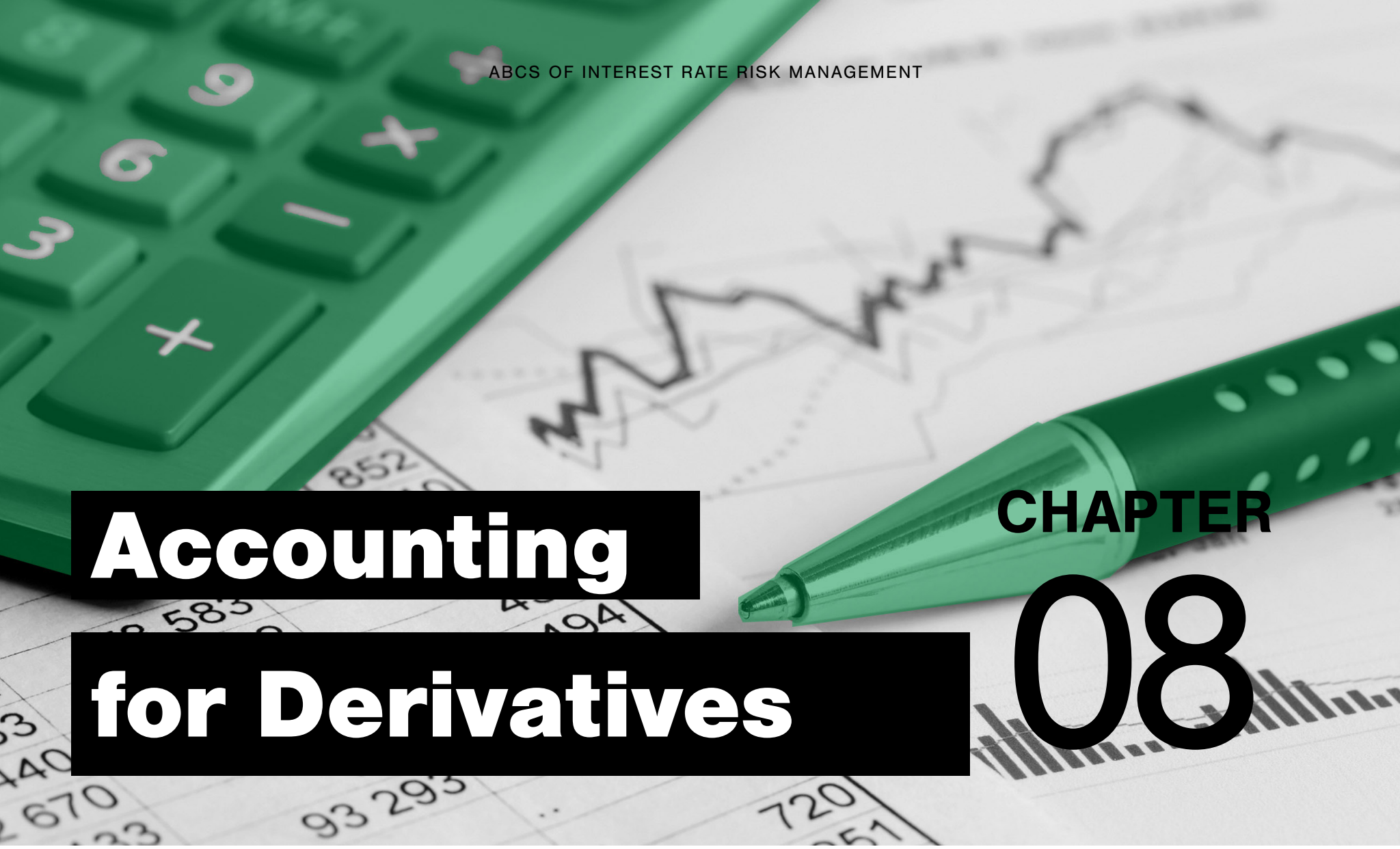
Credit Support Annex – The credit support annex regulates the collateral provisions of the interest rate swap and cap.

Confirmation – The confirmation sets forth the economic and legal essentials unique to each interest rate swap and cap.

Examples of each of the documents listed above can be viewed here or by clicking on the document name.

Section 3: Best Practices in Interest Rate Risk Management





CHAPTER

08

Accounting for Derivatives

Accounting for derivatives is a complex topic with many nuances that go beyond the scope of this e-book. For purposes of this publication, we will touch on the basics of accounting for derivatives. For those that want more detailed information on this topic, you can visit www.hedgestar.com where you will find numerous articles, white papers and other information on accounting for derivatives.

Under ASC 815, a derivative is required to be recognized and measured on the balance sheet at fair value in accordance with ASC 820, Fair Value Measurement. Under ASC 820, the fair value is defined as the price that would be received to sell an asset, or paid to transfer a liability, in an orderly transaction between market participants.

ASC 815 is the accounting standard that dictates how you are to account for derivatives. If a derivative is not designated as a hedge, changes in its fair value are recorded in current earnings. On the other hand, if the derivatives are intended as hedging derivatives, and if those hedging relationships are properly documented, one of two accounting treatments would follow:

1. Fair value derivative accounting
2. Hedge accounting

Fair value accounting applies to interest rate hedges where the exposure being hedged relates to a fixed rate instrument currently on the balance sheet. Cash flow accounting applies to those situations involving variable rate instruments or prospective transactions that are not currently on the balance sheet at the time the hedge is initiated.

Even if the derivative qualifies to be designated as a hedge, it is up to you to decide whether you do, or do not, want to designate the derivative as a hedge. The problem that arises from not designating a derivative as a hedge is that the volatility of the derivative's changes in value is introduced into earnings. Volatile earnings are not ideal for a number of reasons including its negative impact on an institution's enterprise value. If you would like to learn more about the impact on enterprise value from volatile earnings go to *Minimize Earning's Volatility with Hedge Accounting.*

Hedge accounting

Hedge accounting is an especially complex topic, deserving of its own e-book. It is a service that is often outsourced to experts that specialize in this service. To sufficiently apply hedge accounting you need the following:

- Detailed knowledge of ASC 815 and Generally Accepted Accounting Principles ("GAAP")
- A system capable of performing the necessary valuation and assessment procedures
- Access to relevant market data

For a discussion on outsourced versus in-house hedge accounting, you can go to *Should Hedge Accounting Be Outsourced.*

Qualifying for hedge accounting

There are three basic requirements that need to be satisfied for a hedge relationship to qualify for hedge accounting:

1. Formal documentation
2. A highly effective hedge relationship
3. Ongoing effectiveness assessments

Formal documentation

Formal documentation of the hedge relationship is required. At a minimum it needs to include a description of the following:

1. The institution's risk management objective and strategy for undertaking the hedge
2. The nature of the risk being hedged
3. Identification and key terms of the hedge instrument and hedged item
4. The method to be used to assess effectiveness of the hedge relationship

The importance of the hedge documentation cannot be overemphasized. If the document is too vague, you subject your institution to auditor and examiner scrutiny. If the document is too restrictive, you limit your ability to adapt to changing hedging strategies. For this reason, if you are not experienced with drafting formal hedge documentation, it would be prudent to retain a hedge accounting professional to assist with hedge documentation.

Download an example of a formal hedge document can be found at www.hedgestar.com.

Accounting for derivatives

The accounting for derivative gains or losses depends on the intended use of the derivative and its resulting hedge designation. Below is an explanation of the derivative accounting for three scenarios.

- For a derivative designated as a fair value hedge, the gain or loss is recognized in earnings, together with the offsetting loss or gain on the hedged item.
- For a derivative designated as a cash flow hedge, the derivatives gain or loss is reported in other comprehensive income (OCI) and later reclassified to earnings, coincident with the earnings recognition pertaining to the hedged item(s).
- For a derivative not designated as a hedging instrument, the gain or loss is recognized in earnings in the period of change.

Accounting Standard Update (ASU) No. 2017-12

On August 28, 2017, FASB issued ASU 2017-12, which amends ASC 815. While there are a number of changes resulting from ASU 2017-12, the changes most relevant and advantageous to banks are the following:

1. When hedging a portfolio of long-term fixed-rate assets, you are now able to hedge a partial-term of the portfolio. This allows you to effectively match the time-to-maturity of the hedge and hedged item. This will eliminate the maturity mismatch between the derivative and the hedged portfolio that exists under the current standard.
2. You may exclude the consideration of prepayments on loans in hedged portfolios when measuring the fair value of the hedged item(s) in the portfolio.

These two changes are significant for banks as it makes it easier to apply fair value hedge accounting to their portfolios of long-term fixed-rate assets.

For public entities, ASU 2017-12 will be effective for fiscal years beginning December 15, 2018, and interim periods within those fiscal years. For non-public entities the ASU will be effective for fiscal years beginning after December 15, 2019, and in interim periods within fiscal years beginning after December 15, 2020. All entities may early adopt ASU 2017-12 in any interim or annual period after its issuance occurred on August 28, 2017.

For more information on ASU 2017-12 and how it applies to banks, you can go to *Summary of the new Accounting Standard Update relating to hedge accounting. What financial institutions need to know.*

Governance and Policies

CHAPTER 09

The purpose of this section is to describe the framework necessary to implement an effective interest rate risk management program.

There are four key elements that are fundamental to successful interest rate risk management. They are:

1. BOARD AND SENIOR MANAGEMENT OVERSIGHT
2. POLICIES AND RISK LIMITS
3. RISK MEASUREMENT AND REPORTING
4. INTERNAL CONTROLS AND AUDIT

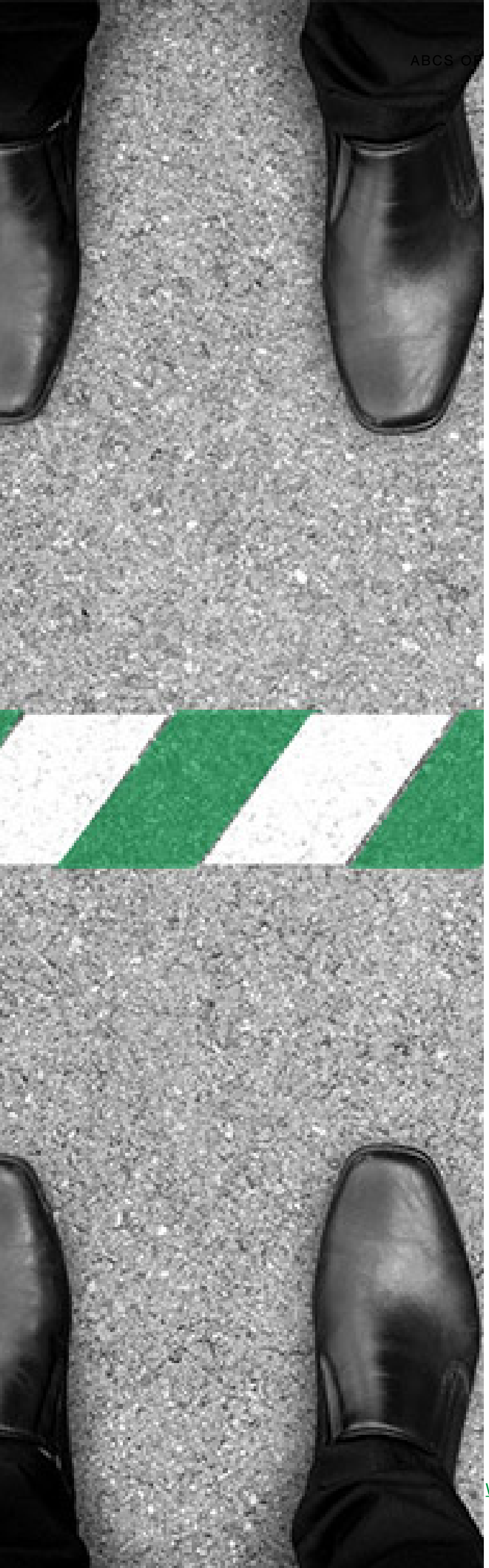
Board and senior management oversight

It is your institution's senior management that is responsible for establishing your institution's appetite for risk, which must be approved by the board. A board is expected to collectively understand:

1. The types of interest rate risk
2. How certain activities in your institution impact those risks
3. How risk management reports should be used to identify exposures

However, not all boards, or board members, are created equal. It is not uncommon for some board members to have limited knowledge of interest rate risk. This makes training for the board important. There are interest rate risk management experts that provide training for board members and key personnel. Directors may not need to be experts in interest rate risk management, but they should have an understanding of interest rate risk management to be able to provide sufficient oversight of the institution and its senior management.

With sufficient understanding of interest rate risk, directors can assess recommended policies, risk limits, and a governance structure that provides the appropriate oversight of interest rate risk. It is common for bank boards to charge committees such as an Asset/Liability Committee (ALCO) with risk measurement and monitoring responsibilities. Critically, board oversight isn't necessarily the end of the story. Regulators regularly evaluate board and senior management in connection with their risk management practices. ALCO committees are also held accountable for implementing the board's guidance, and challenging appropriate risk limits and risk metrics.



Policies and risk limits

Policies should be established that communicate interest rate risk objectives. These policies need to be reviewed and updated on a regular basis in order to adapt to changing interest rate environments. Financial institutions should measure the likelihood of loss from various stressful market conditions, and consider the outcome of those scenarios when developing and reviewing their interest rate risk policies and limits. In addition, consideration of how the institution's capital adequacy requirement aligns with its risk limits needs to be established. Capital adequacy is the amount of capital a financial institution is required to hold to ensure that it is sufficient to cover interest rate risk, as well as other related risks. The amount of capital should be commensurate with the bank's measured level of interest rate risk, aligned with its risk appetite, and documented in its internal policies.

An interest rate risk policy can be a standalone document, or it can reside in a broader asset/liability management document. At a minimum, an interest rate risk policy should include the following:

- The institution's risk tolerance/appetite
- Methods to identify risk
- Methods to quantify risk
- Procedures for reporting exposures
- Identification of the parties responsible for identifying, quantifying and measuring the risk
- Specification of permissible risk management tools and counterparties
- Risk limits and metrics
- Procedures relating to review and adjustment of risk management positions controls to ensure risk limits are not breached

Arguably, the most important facet of an interest rate risk policy is the establishment, and oversight, of appropriate risk limits. An extreme example of a bank that failed on this front is JP Morgan in 2012. Commonly referred to as the "Whale Trade", a single trader executed a series of derivative contracts involving credit default swaps as part of the its "hedging" strategy in April and May of 2012. Because of a lack of oversight, this trader exceeded JP Morgan's established limits and eventually created a trading loss that exceeded $2 billion. These events gave rise to several investigations to examine JP Morgan's risk management systems and internal controls.

While JP Morgan's business is more complex than most banks, sensitivity to risk limits is - or should be - a common concern for banks. Any institution could be severely compromised when risk metrics fail to reflect the true risk exposure, or when risk limits are poorly understood or improperly monitored.

Risk measurement and reporting

At the most basic level, regulators expect interest rate risk metrics to quantify the institution's risk exposure appropriately. With this information, the board and management must determine a reporting frequency with the intent of reacting to changing conditions and risk tolerances. The reporting frequency should be regularly scheduled, with supplemental reviews in response to any material market changes. Precisely how frequently regular reviews are scheduled is a matter of some discretion. For instance, if you have a relatively low interest rate risk profile, perhaps quarterly reports to the ALCO and board are sufficient. However, as an institution's risk profile increases, reporting frequency to the ALCO and/or the board should increase. It is not uncommon for an institution with relatively high interest rate exposure to provide monthly reports to ALCO, and quarterly reports to the board. It is incumbent on each institution to evaluate their risk profile and decide on a reporting frequency that serves them best.

In any case, the review process should provide sufficient information to the board and senior management to allow for an understanding of the sources and magnitude of exposure, identify any potential noncompliance with risk limits, and make timely and effective decisions to address risk.

In those situations where interest rate risk exposures exceed the institution's risk limits, senior management should provide immediate acknowledgement to the board and explain their plan to get the institution back in compliance with the policy. Subsequent meetings should include updates on this plan.

Internal controls and audits

Best practices in interest rate risk management dictate some degree of redundancy. For instance, the risk measurement process should include the following controls:

- Secondary reviews of data accuracy in risk measurement tools
- Validation of reporting compliance and non-compliance with policy limits
- Periodic review of the reasonableness of assumptions used in risk measurement tools

At a minimum, the independent review of these items should be conducted annually by internal audit or an outside consultant.

To be effective, the reviewer must be independent of interest rate risk management activities and have sufficient understanding of the following topics:

- Accounting
- Interest rate risk modeling
- Risk management requirements

Models that are used for measuring interest rate risk need to be robust in several areas to be considered reliable. There should be assurance that accurate data is being used for inputs.

Additionally, models for measuring interest rate risk must be subject to testing and controls to provide comfort that the calculations being produced are accurate. An effective framework for ongoing validation of interest rate risk models includes three essential elements:

- Evaluation of conceptual and methodology soundness
- Ongoing monitoring of the model through benchmarking
- Analysis of the outcomes including back-testing of key internal parameters

Policy for model risk management should establish a process for determining the soundness of the model on both a quantitative and qualitative basis.

Finally, as part of their annual risk assessment, your internal audit group should review the integrity and effectiveness of the risk management system as well as the model risk management process.

To be sure that the reviewer is independent and experienced in all aspects of the review, it is often considered best-practice to contract this review with an outside party that is experienced performing similar independent reviews. As with any review or audit, results should be reported to the board, and action plans should be developed to address weaknesses found by the reviewer.

Community banks face constant challenges based on their shared business model – funding long-term assets with short-term liabilities. Deploying best practices related to their interest rate risk management programs will help them avoid the pitfalls that can occur in this environment.

Conclusion

You should now know what factors constitute interest rate risk. Along with that, you should now have an idea of what it takes to measure and manage interest rate risk. You should also understand what accounting options are available for your institution's hedging program, and you should have an understanding of what best practices look like in a hedging program.

The first step in managing any risk is recognizing that the risk exists. When it comes to interest rate risk, this is done through measurement. Recall the blood pressure analogy from the introduction. If you measure your blood pressure and it is at a level that presents risk to your health, you are now in a position to take action to manage your blood pressure and decrease the health risk. The same holds true for interest rate risk. Through consistent measurement practices you are able to identify risk and mitigate it before it becomes harmful, or fatal.

The process of interest rate risk management is not a trivial exercise. It requires substantial resources, planning and coordination across business units. This e-book represents just one step in your process of bringing optimal interest rate risk management strategies to your institution. There are training opportunities, analytical tools and experts available as resources for your interest rate risk management program. In combination, all of these will offer solutions that will insulate your organization from the harm that can result from unmitigated interest rate risk.