HEDGE ACCOUNTING
IN BANKS
IN THE LIGHT OF
THE INTERNATIONAL FINANCIAL REPORTING
STANDARDS

Master’s Thesis

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Introduction

In several ways the 1990’s were a turning point in the history of financial markets. The continuous growth of the global markets led to involvement of a great number of manufacturers and service providers to emerging markets, which was followed by increase of global financial operations at unobserved scale, performed in countries of different economic and political regimes. Consequently it led to an increased level of risks faced by corporate and financial institutions operating in the global market. These risks include both private (i.e. political and environmental) and financial (i.e. currency, liquidity and interest rate) risks.

The global increase of risk level in the global economy was one of the reasons for a quick development of the financial markets, particularly of derivatives, which were aimed at handling those risks by means of hedging. The market and financial analysts gather information on banks (and other corporations) from their financial statements, which are prepared in accordance with accounting standards effective in different countries. Traditional accounting rules often fail to clearly and adequately present the economic sense of hedging operations; as a result certain banks may be penalized by market participants for occurrence of “accounting mismatches” in their balance sheet and income statements.

New concepts of accounting for financial instruments allow certain exceptional accounting treatment for risk management activities, which are aimed at reducing the “accounting mismatches”. One of those concepts is hedge accounting, where, subject to certain conditions, entities are allowed to present the results of hedging activities in a way, which reveals the economic sense of operations on risk management derivatives and allows their transparent presentation in financial statements. Hedge accounting is allowed under two major financial reporting standards: the International Financial Reporting Standards (IFRS) and Generally Agreed Accounting Principles of the United States (US GAAP).
Until now, several working papers, academic articles and textbooks elaborated on hedging techniques and application of hedge accounting under IFRS and US GAAP for industrial corporations.

The goal of this thesis is to present hedge accounting application by banks in the light of the IFRS, as a prevailing accounting regime in Europe. Several applications of hedge accounting applications by a universal bank are analyzed in the thesis.

The theoretical part of the thesis banks are referred to as companies trading in risks. The paper briefly describes those risks and their sources, as well as explains how those risks can be measured and mitigated. Next, common risk management practices in banks are explained. Further, New Basel Accord is presented as a comprehensive framework, which equips banks and national banking supervision authorities in tools, which enable to keep financial and non-financial risks at an acceptable level. Finally, basic assumptions of the hedge accounting models allowed by the IFRS are presented, as well as the criteria of hedge accounting application in the light of the IFRS.

The empirical part of the thesis comprises a hedge accounting applications based on author’s experience in Polish banking sector. It includes analyses of three examples of applications of hedge accounting, presents the “accounting mismatches” arising when hedge accounting is not applied, provides analyses of feasibility of hedge accounting application in accordance with the IRFS, and finally elaborates on the accounting treatment of analyzed risk management strategies under hedge accounting.

The paper is composed of eight chapters, which cover the issues listed in the Abstract.
Abstract
Chapter 1 briefly presents banks as institutions where financial risk management plays a crucial role. It also explains financial risks, to which banks are exposed, as well as explains how those risks can be measured and managed.

Chapter 2 shortly explains how banks use derivatives for risk management and other purposes, as well as briefly explains what hedging of financial risks is. The chapter also gives an outline of best banking practices with respect to risk management and organizational issues, based on author’s professional experience.

Chapter 3 is devoted to capital adequacy of banks and the regulatory capital. It gives a brief description of the New Capital Accord, as a comprehensive framework aimed at ensuring appropriate risk management in banks and stability of the global financial sector.

Chapter 4 presents basic principles of financial instruments accounting in the light of the International Financial Reporting Standards by explaining how different categories of financial instruments are accounted for under International Accounting Standard 39. It also explains the phenomenon of accounting mismatch and gives sample answers to how the accounting mismatch may be reduced.

Chapter 5 deals with the hedge accounting concept as one of measures by which accounting mismatch may be eliminated, applicable under International Accounting Standard 39. The chapter explains different types of hedge accounting models allowed by IAS 39.

Chapter 6 shows hedge accounting as a privilege, which is allowed for entities subject to certain conditions. The chapter goes through hedge accounting criteria in the light of IAS 39.
Chapter 7 is devoted to practical issues connected to hedge accounting application in banks. The chapter presents three examples of hedge accounting application in universal banks, based on author’s professional experience in the Polish banking sector.

Chapter 8 presents conclusions and areas for further research in the area of hedge accounting application in banks.
1. Financial risks in banks

1.1. Banks as firms trading in risk

Most textbooks define a bank as an organization, usually a corporation, chartered by a state, which is involved in banking operation, usually understood as receiving demand deposits and time deposits, granting loans to different types of borrowers and investing in securities.

The above definition implies that banks trade in risk. Banks are exposed to various types of risks, both private and financial ones. Those risks include not only credit risk (i.e. risk that a bank’s debtors will fail to repay the borrowed amount or interest due), but also interest rate risk (e.g. arising from a mismatch between rates of interest paid on customers’ deposits and rates of interest received on granted loans), currency risk (e.g. when amounts due from customers are denominated in different currencies than amounts owed to depositors) and liquidity risk (e.g. resulting from mismatches in repayment terms of loans and deposits).

Thus, it may be stated that banks are institutions trading in risks. The above quoted examples of risks faced by banks are enough to conclude that banks need to hedge their exposure to financial risks.

1.2. Exposures to financial risks faced by banks

In their business activities, banks face all types of financial risks. Those risks include particularly credit risk, interest rate risk, foreign exchange risk, and liquidity risk. Those risks arise from the structure of banks’ assets and liabilities, which usually does not provide a perfect matching of terms, currencies and fixed / variable interest rates at which banks lend out and purchase funds. Banks may also face other types of risks attributable to banking products linked to such risks. An example of such products may be commodity risk or equity price risk resulting from structured deposits linked to commodity or equity indices.
It is essential to mention that financial risks are inherent to banking activity and thus banks need to monitor and manage their exposures to risks on an ongoing basis. For the purpose of the thesis, the most important types of risk, which may be managed through involvement in financial instruments, particularly derivatives, are market risk, credit risk and liquidity risk. Sections 1.3 – 1.6 are aimed at presenting that risk, as well as how they can be measured and managed.

1.3. Market risk management

1.3.1. What is market risk

Market risk may be defined as uncertainty as to future profit or loss, which is due to changes in market factors, to which a bank’s assets and liabilities are exposed. Market factors mentioned above are prices observable in active markets. Among the most important prices, to changes of which banks’ assets and liabilities are exposed, are the “price” of money – i.e. the interest rate, prices of foreign currencies, i.e. foreign exchange rates, prices of commodities (if a bank issues financial instruments, which prices are connected to quotations of commodities’ prices), and prices of equity instruments (if a bank trades in equities).

With respect to the above, the most important market risks, which need to be monitored and actively managed by banks, are:

- interest rate risk,
- currency risk,
- commodity price risk.
- equity price risk.
1.3.1.1. Interest rate risk

Interest rate risk, also referred to as fixed-income risk is a risk connected to potential movements in the level and volatility of bond yields\(^1\). When bonds issued by a state treasury, it may be assumed that they carry no risk. Assuming the above, it may be stated that the only factor affecting prices of such bonds are risk-free interest rates. The simplest relation between the level of interest rates and prices of bonds is the following: when the level of interest rates shifts upwards, bond prices move downwards. This relation is a consequence of the formula used for valuation of fixed-income securities, depicted below\(^2\):

\[
(1.3.1) \quad P = \frac{\sum_{t=1}^{T} C_t'}{(1 + y)^t},
\]

where \(P\) stands for the price of a bond, \(C_t'\) – for cash flows generated by the security in time “\(t\)”, and \(y\) is a discounting factor appropriate for the “\(t\)” period of time. The above formula reflects the “time value of money concept”, which lies at the foundations of discounted cash flows valuation methods. The discount factors used for valuation of bonds (\(y\) in the formula) depends on the level of market interest rate for tenor “\(t\)”. Market makers in the financial markets are able to quote interest rate for any tenor – beginning from 1 day (overnight, or O/N tenor), up to several years. In the terminology used by financial markets participants, interest rates with tenors up to one years belong to the money market (i.e. financial market for short-term financing) and interest rates with tenors over 1 year – to capital market (i.e. financial market for long-term financial instruments). Interest rates in the money market are quoted based on current yields of zero-coupon short-term treasury securities (i.e. treasury bills, which maturity does not exceed 52 weeks). Examples of such rates are GBP LIBOR – for the Great Britain Pound, CHF LIBOR for Swiss Frank, EURIBOR for Euro and WIBOR for Polish Zloty. Interest rates for tenors exceeding 1 year are quoted using prices of interest rate swaps (IRS), which is a derivative, whose one leg is a stream of fixed-coupon payments, and the second leg is a stream of floating rate payments.


\(^2\) Ibidem, p. 6.
Should interest rates for all tenors be annualized, boot-strapped and presented in one chart, the chart would create a yield curve. Yield curve is a source of information, from which discount factors used in formula 1.3.1 may be calculated. As described above, formula 1.3.1 is applied to risk-free fixed-income instruments. However, it may be modified for instruments carrying e.g. credit risk. Such modification would involve increasing risk-free interest rates by a credit spread, which represents a premium to the security holder for the risk of debt issuer’s default.

All fixed-income assets and liabilities, which a bank is involved into, are source of interest rate risk.

### 1.3.1.2. Currency risk

Currency risk arises from potential movements in the value of foreign currencies\(^3\). Another words, currency risk represents uncertainty regarding the future changes in the value of foreign-currency denominated assets and liabilities, or the changes in the value of cash flows, which are due to changes in foreign exchange rates. Currency risk is bound to the currency regime present in the country, by which a given currency is issued. Presently, most countries have currencies, which are pure floated. In a pure float currency system the only factors influencing their exchange rates are the market forces, i.e. the market’s demand for those currencies and the money supply, being a resultant of the monetary authorities’ policy and the bank’s credit action.

Nonetheless, it should be mentioned, that in today’s economy certain countries have fixed interest rates. An example can be China, whose currency is pegged to the US dollar. In fixed currency system, the source of currency risk is uncertainty regarding future decisions of the monetary authority concerning a devaluation of their domestic currency. Devaluation is an administrative decision taken by monetary authorities, usually aimed at reducing inflationary pressure, and results in an immediate change of value of assets and liabilities denominated in such currency.

\(^3\) Ibidem, p. 281.
1.3.1.3. Commodities price and equities price risk

Except for interest rate risk and commodity risk, banks are often exposed to other sources of market risk. These are risk connected to changes in prices of commodities and equities and arise when banks have in their portfolios assets or liabilities, which prices are dependent on prices of commodities or equities. Banks may be exposed to those risks directly, i.e. when they invest (or trade) in equities (e.g. shares) or commodities (e.g. gold or other metals), or indirectly, i.e. when banks offer to their clients derivatives or compound products with payouts dependent on the level of commodity or equity indices or their baskets. An example of such instruments may be forward contracts or options on metals or structured investment deposits linked to commodity or equity indices.

1.3.1.4. Options risk

Options are financial derivatives with asymmetric payouts. Options give to their holders a right, but no obligation, to perform a certain action. Usually such action, called an exercise of an option, is connected to purchase or sale of an asset, e.g. foreign exchange or shares. Option price, called option premium, is sensitive to changes of certain market factors, including the exercise price, interest rates and time left to option expiration. Sensitivities of options to those factors (called “greeks” due to the fact that most of them are named after letters of Greek alphabet) are the most important determinants of risk connected to maintaining an open position in options. Most commonly used greeks are the following:

- Delta, which is an option premium’s sensitivity to changes in the level of price of the underlying asset. Mathematically delta may be expressed as a derivative of the option price function with respect to the price of the underlying asset. Delta, which is also a function, may reach values from zero to one. Delta may be interpreted as a probability of the option execution. For a call option, the lower the current price of the underlying asset, the lower the delta. Generally, delta of an out-of-the-money call option is in the
range \((0; 0.5)\), of an at-the-money call option – equal to 0.5, and of an in the money option – in the range \((0.5; 1)\). This relation for a call option is depicted in Figure 1.3.1.

On the contrary, delta of an in-the-money put option is in the range \((-1; 0.5)\), of an at-the-money put option – equals to -0.5, and lays in the range \((-0.5; 0)\) for an out-of-the-money put.

It is important to mention that delta may be hedged against using a purchase or sale of a portion of the underlying asset, or a forward contract for such asset (a so-called delta hedge).

- Gamma – an option premium’s sensitivity to changes of delta. Figure 1.3.1 also presents the relation between the option’s delta and the option’s time to maturity. It can be seen, that the shorter the option’s maturity, the more the option price is sensitive to changes of prices of the underlying asset, which means that when options
approach their maturities and are close to being at-the-money, their delta becomes unstable. The instability of delta is measured by gamma, which is a derivative of delta with respect to the price of underlying asset and is identical for a call and a put option. Relation between gamma, spot price of the underlying asset and option’s maturity is depicted in Figure 1.3.2.

As can be seen in Figure 1.3.2, at-the-money options have the highest gamma. The interpretation is that delta of such options changes fast as the spot price changes. It can also be seen that far out-of-the-money and far in-the-money options have low gamma, which is because their deltas are close to one or zero, respectively.

- Theta is an option premium’s sensitivity to the time left to expiration of an option. It is also referred to as “time decay”. Theta, mathematically being a derivative of the option price function with respect to time, is negative for long positions both in call and put options. This means that options lose value as their maturities approach. 

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Similarly to gamma, theta is (in absolute terms) the greatest for short-term at-the-money options\(^5\).

- **Rho** – option premium’s sensitivity to changes of the interest rate. Rho is positive for call options, as an increase of the rate of interest positively influences the price of the underlying asset, thus increasing the probability of option becoming in-the-money. For a put the relation is opposite\(^6\). Currency options are exposed to changes of the interest rates of both quoted and basis currency, and therefore a currency option has two measures of sensitivity to changes of the two interest rates: rho and phi.

- **Vega** – option premium’s sensitivity to the changes in the implied volatility of the underlying asset. Mathematically vega (also referred to as kappa) is a derivative of option price function with respect to volatility. Volatility is the only parameter of option valuation, which may not be directly observed in the market. Vega is positive for long positions in both call and put options. The relation between the value of vega, price of the underlying asset and option’s maturity is presented in Figure 1.3.3.

  As can be seen in the chart, options with longer maturities have greater vegas. Intuitively this may be interpreted that a European option with a long maturity will expire in a long time, which may be hardly predictable. In such time horizons even far out-of-the-money options may become exercisable, and far in-the-money ones – worthless. On the contrary, a far-out-the-money option, which matures in e.g. one day, is very unlikely to become exercisable.

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\(^6\) Ibidem, p. 339.
Options may be hedged using different techniques. The greek that is the easiest to hedge is the delta. Generally a delta of an option (or options portfolio) may be hedged using a proportion of the underlying asset or a futures/forward contract. Such hedge (called a delta hedge) involves a purchase (or sales) of an amount of the underlying assets. The amount of the asset purchased or sold is calculated as the options nominal multiplied by the delta. Due to the fact that delta changes over time, the hedge has to be adjusted and becomes a dynamic delta hedge⁷.

It is essential to mention that all greeks, with an exception of delta, may only be hedged with other options. Therefore, a bank, which holds an open position in options, requires monitoring greeks of the portfolio in order to properly manage options risk.

⁷ Ibidem, p. 346.
1.3.2. Market risk measurement

The most commonly used method of market risk measurement is “Value at Risk” (VaR). Value at risk is a world-wide known and commonly used concept of market risk measurement. The definition of VaR is the following:

Value at Risk is the maximum loss over a target horizon such that there is low, pre-specified probability that the actual loss will be larger.\(^8\)

The above definition means that VaR is a measure of downside risk (the risk of a loss), and does not take into account the upside change (a probability of generated a profit). Another implication is that VaR may be calculated for a given time horizon and a certain confidence level has to be assumed.

VaR methodology is based on a historic distribution of returns (e.g. daily) of the portfolio, for which risk is measured. If that distribution is close to normal distribution, the mean return equals to zero, the right-hand side of the distribution chart presents gains historically earned with certain probabilities, and the left-hand side of the distribution presents losses historically earned with certain probabilities. Obviously, the extreme gains (extreme losses) are presented in far-right area of the distribution chart (far-left area, respectively). What VaR captures, is the area in the chart between the mean and the quantile representing an assumed confidence level. For instance, a confidence level of 95 per cent would mean that the quantile of \(1 - 95\) percent, i.e. of 5 per cent should be deducted from the mean value. The above implies that mathematically VaR is the difference between mean and quantile.\(^9\) Figure 1.3.4 depicts graphically the interpretation of a 5 per cent VaR for a sample normal distribution of daily returns.

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\(^8\) Ibidem, p. 246.
\(^9\) Ibidem, p. 248-249.
The obtained VaR number may be interpreted as a maximum loss generated by the analyzed position in a one-day horizon, with 95 per cent horizon.

The procedure for VaR calculation is similar for bigger time horizon and requires re-scaling the distribution of returns to e.g. 10-day returns.

The popularity of VaR can be explained by the fact that this measure is fairly easy to calculate and interpret, if the return distribution is normal. However it should be emphasized that for non-normal distributions (particularly skew with data clustering effect), VaR measure is less useful. This is because skewness and clustering results in occurrence of “fat tails” in the distribution. Thus, a confidence level of 95 per cent leaves a great deal of losses out of the calculated VaR amount. Therefore VaR is always subject to sampling error. It should also be mentioned that VaR does not capture the worst loss scenario, which may be particularly painful for skew distribution. Also, VaR says nothing about the value of expected loss. The above shows that with a given confidence level, the loss should not exceed a certain amount.

The above shortcomings of Value at Risk may be partly eliminated, e.g. by reviewing the whole distribution of returns used for VaR calculation. Such information should allow risk professionals to assess how good the VaR calculation is. Another improvement to
VaR is Conditional Value at Risk concept. Conditional VaR presents the expected loss in case it exceeds the VaR and is referred to as “conditional loss” or “expected shortfall”\(^\text{10}\)

### 1.3.3. Market risk management

Market risk can be managed using financial instruments, which terms assure good hedging effectiveness. As the goal of a hedge is limiting the volatility (understood as the exposure to risk being hedged against) of the hedged instrument, an effective hedge should provide an offsetting effect to the returns of the hedged item. Hedging activity is usually executed by means of taking a position in an instrument having an opposite risk exposure than the hedged instrument. Hedging of market risk is usually performed by means of taking an opposite position in derivatives having a similar profile with respect to the hedged risk, as the hedged instrument. For example, hedging against interest rate risk of a purchased fixed-coupon bond may be effected by going short in interest rate futures or forward contracts in a proportion satisfying the assumed effectiveness criteria. It is important to mention that if standardized (e.g. exchange traded) derivatives, e.g. futures, are applied as hedging instruments, it may be difficult to find a hedging instrument, which risk and other characteristics (i.e. reference rates, notional amounts, tenors etc.) perfectly match the same characteristics of the hedged instrument or portfolio. Such situations expose the entity applying hedging to basis risk, which may negatively affect the effectiveness of the hedge\(^\text{11}\).

Hedging effectiveness may be measured in several ways. When hedge effectiveness is assessed prospectively, i.e. when an entity predicts whether the hedge will be effective in the assumed time horizon, it needs to carry out an analysis of future FX and/or interest rates. This may be done either by using forward market rates or via a statistic approach, e.g. by calculating historic correlations between the performance of the hedged items and hedging instruments. In a perfect hedge, such correlations in all time buckets should amount to -1, thus assuring a perfect offset.

\(^{10}\) Ibidem, p. 250-251
\(^{11}\) Ibidem, p. 313-314.
For portfolio hedges it is often easier to assess the prospective effectiveness by applying commonly used risk measures, i.e. by comparison of VaR’s of the hedged portfolio and of the hedged portfolio.

However, real hedge effectiveness may only be tested using real performance of the hedged and hedging positions. This may be performed by computing and comparing the historic correlations of the two positions, which was observed in the period, for which effectiveness is being measured. For unitary hedges effectiveness may be back-tested by means of simple comparison of valuation result or value of cash flows generated by the two positions in the period for which effectiveness is being tested.

Alternatively, for portfolio hedges, VaR or bpv calculation may be re-performed using real (i.e. historical, not expected) computation input.

Among factors leading to ineffectiveness of hedges the following should be enumerated:
- basis risk (briefly described above)
- transaction costs (i.e. spreads and margins paid on both hedged and hedging items).

Hedges may be divided into static hedges and dynamic hedges.

A static hedge is a one, where the position in the hedging instrument is not adjusted in the assumed time horizon of a hedge. In a dynamic hedge, the position in the hedging instrument is adjusted on an ongoing basis to the hedged position in order to reflect its risk characteristics\(^\text{12}\). It should be mentioned than a static hedge is effective only in case the hedged position is linearly related to the risk, otherwise such hedge may become ineffective.

In Central European banking practice, market risks are usually hedged by OTC (over the counter) instruments, which allow tailoring those instruments to the characteristics of hedged position: IRS and CIRS contracts, as well as FX Swaps. Examples of such hedges are hedged of interest risk of fixed corporate bonds against interest rate risk using IRS (either on micro or portfolio level), hedging of loans portfolio against interest rate risk using IRS (on a portfolio basis for aggregated retail loans or on a unitary basis for large

\(^{12}\) Ibidem, p. 311.
exposures), hedging FX-denominated corporate bonds against interest rate and FX risk using CIRS (which notional amounts may amortize in order to match features of hedged bonds).

Non-linear risks, i.e. arising from positions in options, may either be hedged using a proportion of the underlying asset (delta hedge) or using other options (in order to hedge against greeks other than delta).

Delta hedges are usually dynamic macro hedges, which means that the hedging instrument (for FX options usually FX Swaps) is constantly adjusted to the changing delta of the hedged options portfolio.

Other greeks of options are hedged on a macro basis by means of taking positions in OTC options, which allow to actively manage the hedged portfolio’s exposure to risks of changing delta, theta, vega and others.

### 1.4. Credit risk management

#### 1.4.1. What is credit risk

Credit risk is the risk of a loss from a failure of counterparty to fulfill its contractual obligation. Credit risk encompasses both settlement and pre-settlement risk. Pre-settlement risk is a risk that the counterparty will fail to fulfill obligations resulting from a contract over the contract life, whereas settlement risk arises from an exchange of cashflows and is usually connected to short-term contracts. An example of pre-settlement risk may be a risk that a bond or loan issuer fails to realize required payments on predefined dates. While example of settlement risk may be a situation where two banks conclude a currency conversion and one of them fails to pay an agreed amount of currency A, after it has received the agreed amount of currency B.

Traditionally the term credit risk is associated with pre-settlement risk.

The most commonly quoted variables influencing credit risk are the following:
- default, i.e. a counterparty failure to settle an obligation occurring with a given probability (PD – probability of default)

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- credit exposure, or exposure at default (EAD), which represents the economic value of the amount claimed at the moment of default;
- loss given default (LGD), which represents a fraction loss of the total claim in case of default occurrence.

1.4.2. Credit risk measurement

Initially credit risk was measured using notional amounts of exposures, to which an arbitrary multiplier was applied in order to calculate the amount of exposure to credit risk. Such treatment of credit risk completely ignores the fact that probability of default may differ for different types of exposures. The first attempt to this problem was credit risk categorization performed by the Basel Committee in 1988. Under that categorization, different types of exposures were assigned with risk weights, which were aimed at reflecting the realistic risk of default occurrence.

The next era in credit risk measurement started in 2001, when the Basel Committee issued a proposal, which allows banks to use their own stochastic models in order to assess credit risk arising from their exposures.

In today’s practice, credit risk is quantified using either actuarial methods or market price methods.

The actuarial methods are aimed at providing an objective risk measure based on historical data concerning credit events of given debt issuer. Credit events are defined as failure to pay an obligation due to different reasons and even a default on a similar type of exposure, which may accelerate default of the exposure, whose credit risk is being assessed. Actuarial methods are used by rating agencies, which provide different types of debt issuers (companies, countries) with credit ratings, being “evaluation of creditworthiness”. Using historical default record of debt issuers, rating agencies classify them according to cumulative default expected in the next years.

Models similar to the ones used by rating agencies may be developed internally, e.g. for assessment of an entity’s own credit risk.
Another approach to quantification of credit risk is applied by models based on market prices. The idea standing behind those models is that prices in the financial markets may be used for reading information on credit risk. An example may be corporate bonds, which naturally carry a certain portion of credit risk. Their expected rate of return should then include a risk premium to compensate holder of such bond for credit risk. The risk premium, which is an excess spread over the risk-free rate, may be a good source of information on the default probability. Usually statistical models for credit risk assessment investigate cross-sections of credit spreads of bonds issued by different types of issuers in order to build a time series, based on which credit risk is assessed.

Banks, when assessing the credit risk of their receivables, usually separately analyze risk associated with small retail exposures, and separately risk arising from large exposures. Whereas the latter is assessed based on detailed analysis of accounting results of the debtors, retail exposures are grouped into homogeneous portfolios and each group is analyzed separately for the probability of default.

### 1.4.3. Credit risk management and credit derivatives

Traditional credit risk management in banks is based on risk provisioning. Determining a risk provision includes calculation of an expected credit loss, from which the expected recoveries and the value of collateral held are deducted. Provisions for credit risk are expensed through a bank’s profit or loss.

Another implication connected with credit risk in banks is a regulatory capital requirement. Under central banks’ regulations, which for most European economies are in line with Basel I (and beginning from 1 January 2008 – from Basel II), banks need to maintain a certain level of capital, which should cover all major risks faced by the bank, which may be costly. In 1990’s banks started securitizing their assets, e.g. by selling them to Special Purpose Vehicles financed with bonds issues. As a result, the banks could eliminate certain unwished assets from their balance sheets and release the regulatory capital. Securitization may also be carried out without a physical sale of assets, but using credit derivatives. Deciding whether securitized assets (in course of traditional or
synthetic securitization) may be eliminated from the selling bank’s capital requirement calculation requires an in-depth analysis in accordance with local banking regulations (based either on Basel I or Basel II principles), which central point is determining if securitization transaction resulted in transferring out the substantial credit risk to the transaction counterparties\textsuperscript{14}.

Credit derivatives, which are a fairly new development of the financial market, allow a transfer of credit risk from the contract purchaser to its holder. By means of credit derivatives banks may securitize credit risk and release their regulatory capital requirements (synthetic securitization).

An example of a credit derivative is credit default swap (CDS). In a CDS contract, the buyer of credit protection pays a premium to the protection seller. Simultaneously, the protection seller is obliged to make a payment in case of a default, as defined in the CDS agreement\textsuperscript{15}. In a CDS transaction the counterparties have certain latitude in defining the terms of a transaction. For example, they may choose among various reference instruments (bonds, loan portfolios), which default shall result in execution of credit protection pay-out. Also the pay-out may be defined as a lump sum or a series of cash flows. Valuation of CDS requires a detailed analysis of credit risk carried by the reference instrument.

Another example of a credit derivative is total return swap, where the protection buyer makes a series of payments depending on the rate of return of a reference instrument to the protection seller, who in exchange makes a series of payments tied to a reference rate to the protection buyer. Should the reference portfolio default, its rate of return shrinks to zero and the credit protection is exercised. As can be noticed, a total return swap is a kind of “credit asset swap”, where the reference asset (e.g. a portfolio of loans or corporate securities) is swapped to a risk –free portfolio\textsuperscript{16}.

Taking into account that the main subject of this thesis is hedge accounting, it is worth mentioning that in the light of the currently effective IFRS, credit risk is not subject to hedge accounting.

\textsuperscript{14} Please refer to Chapter 3 for more information on capital adequacy.
\textsuperscript{16} Ibidem, p. 495-496
1.5. Liquidity risk management

1.5.1. What is liquidity risk

Liquidity risk is a risk that an entity will lack funds sufficient to cover its liabilities on their contractual dates. Liquidity risk, defined as above, is also referred to as cash flow risk. Liquidity risk may also encompass the so-called asset liquidity risk, which arises when an entity is unable to liquidate an asset at its fair value (i.e. at conditions prevailing in the market at the moment of sale), e.g. due to a huge size of transaction, which influences the existing relation between supply and demand\textsuperscript{17}. It should be mentioned that liquidity risk is closely connected to both credit and market risks. That is because future liquidity depends on whether the entity’s debtors fail or not to make payments to the entity on their contractual dates. The relation to market risk is among others expressed by asset liquidity risk, as it in facts relates to market conditions (i.e. market liquidity).

1.5.2. Liquidity risk management

Liquidity may be measured calculating the gap between the entity’s liquid assets (consisting of cash and cash equivalents) over its liabilities. The liquidity gap may be constructed as immediate gap, which means that the amount of liquid assets is confronted with the entity’s all liabilities, no matter the maturity date. Another measure is structural liquidity gap, which presents the entity’s liquid assets in different time buckets are confronted with liabilities occurring in those buckets. Under such approach, immediately available are included in the nearest time bucket, whereas liquid assets in further time buckets are calculated based on future expected cash flows (rather than on contractual ones, which may be lower due to credit risk).

The goal of liquidity risk management is to keep a reasonable–or, in case of banks, required by the market regulator–balance between excess liquidity and asset profitability.

\textsuperscript{17} Ibidem, p. 574.
The trade-off between liquidity and maintaining high return on assets is due to the fact that, from an economic perspective, liquidity is relatively costly—liquid assets are cash (bearing no interest) and treasury securities (which bear only risk-free rate). On the other hand, generating a high rate of return (i.e. generating of an economic profit) requires involvement in risky investment.

Banks usually manage their liquidity using a system of liquidity limits. Under a system of limits, banks monitor excess liquidity in appropriate time buckets, and monitor the age structure of their liabilities. Efficient liquidity management should involve determining a desirable level of liquidity, which on one hand assures timely servicing of liabilities, and on the other hand allows efficient investment of the capital and other financial resources.

1.6. Other risks faced by banks

The chapter describes the financial risks faced by banks. However, it should be mentioned that in their activities, banks are also exposed to non-financial risks, so called private risks. The basic difference between financial risks and private risks is that the latter cannot be quantified, and therefore their management is more difficult.

Private risk in banks includes mainly operational risk, defined as a risk of a loss due to human error or fraudulent activities. Operational risk management requires for a bank to have an internal control function, comprising of a system of instructions and procedures in place, as well as the controlling and internal audit functions.\(^{18}\)

\(^{18}\) New concepts of risk management assume that non-financial risks (liquidity risk, operational risk) can be quantified. Please see Chapter 3 for more on that topic.
2. Risk management and application of derivatives in banks

The chapter explains how banks use derivatives for risk management and other purposes, as well as briefly explains what hedging of financial risks is. The chapter also gives an outline of banking practices with respect to risk management.

2.1. Purposes of financial risk management in banks

In the 1970s, after the collapse of gold standard—based Breton Woods systems the importance of financial risks grew rapidly, which was among others due to the fact that rates of exchange of most of currencies, crucial from the global economy viewpoint were floated in reaction to the oil crises. The financial markets reacted to this break-through with a development of new instruments, called financial derivatives. A derivative is an instrument, which value depends on the value of an external factor underlying to the derivative, for instance the currency exchange rate, value of a different financial instrument or a non-financial factor, or a basket of different factors. Other words, financial derivatives allow the parties entering into a derivative transaction the creation of an asset or a liability, which are contingent on an exogenous factor, thus allowing the counterparties to create an exposure to different types of risk19.

As the cost of entering into derivative transactions is usually lower than the cost of purchasing or short-selling the underlying asset, derivatives allow market participants to profit from financial leverage, which means that they can create an exposure to a given risk without disposing all resources necessary for purchasing the asset, to which the risk is inherent. This feature led to a fast growth of the market for derivatives, caused by the activities of three groups of market participants, to whom the new market created a vast range of opportunities. The groups include:

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• Speculators, who open to exposures to different types of risks in hope for a market out-performing returns based on their predictions concerning future changes of prices of underlying assets;
• Arbitrageurs, who are able to take advantage of price differences between derivatives and underlying assets, and
• Hedgers, who use derivatives in order to close out exposures faced due to their business activities, thus eliminating the risk of future changes in prices of underlying assets.

Presently commercial banks remain active in the derivative market as speculators and apply derivatives for hedging purposes. Consequently, the use of derivatives for the two purposes created the division of the banking activities into “banking book” and the “trading book”\textsuperscript{20}.

The banking book encompasses a bank’s commercial activities, such as granting of loans and taking deposits from retail and corporate customers and others. The structure of banking book assets and liabilities usually to certain extent provides a “natural hedge”. In a natural hedge, a portfolio of assets economically hedge a group of liabilities of similar risk exposure, including the nature of risks, as well as their maturities and projected cash flow occurrence. In a perfect world, banks might structure their balance sheets in such a way that all banks’ liabilities be hedged by their liabilities. In practice, such structure of assets and liabilities may not be achieved in the long run. This is due to existence of several gaps observed in the dynamic structure of assets and liabilities, including different sizes of similar groups of assets and liabilities, different maturities and exposures to risks of different nature.

Banks usually cover those gaps with derivatives. Using internal transfer pricing systems, banks effectively measure the extent to which the natural hedge is achieved and hedge their risks (usually market risk) with derivatives on the net basis, which means that only the part of assets and liabilities not covered by the natural hedge are modified using derivatives.

\textsuperscript{20} Chapter 3 contains more information on the trading book and the banking book.
Such derivatives, used purely for hedging purposes are accounted for in the banking book in the capital adequacy calculations.

The other group of assets and liabilities of a commercial bank represents the trading book, which encompasses financial assets and liabilities used for speculative purposes. In the trading book banks usually have debt securities and derivative transactions entered into in speculative purposes. With respect to the trading book banks act as speculators by taking risk and expecting favorable changes of the market factors, which would generate extra profits. Therefore, in most countries banking supervisors require banks to have additional capital coverage for that type of activities.

Additionally, most banks also have strategic portfolios in which the banks’ spare funds are invested. Such portfolios are liquidated when banks have opportunities to invest the funds in more profitable operations, such as extension of the credit action. Strategic portfolios usually consist of long-term and risk-free (i.e. issued by state treasury) bonds, which accounting wise are presented as “Securities available for sale” (AFS) and their valuation is recycled through revaluation reserve presented in equity. When banks expect to need a given amount of funding of new loans issuance, strategic portfolios require structuring, in order to adapt the maturities and risk exposure to the future funding requirements. Therefore, banks often add to their strategic portfolios derivatives aimed at changing the risk structure of those portfolios. Such derivatives, although presented as “Trading derivatives” under IFRS-compliant financial statements, are managed together with the strategic portfolios. In this case, such derivatives also play a risk management function.

### 2.2. Hedging and hedge effectiveness

A hedge is a strategy designed to minimize the unwanted risk of another transaction. A hedging item is an instrument, or a group of financial instruments, which replicate the change in value of the hedged item, which is attributable to the risk hedged against.
The effectiveness of hedging depends on the correlation of the hedged item and the hedging item. The correlation has to be negative, so that the changes in values of cash flow of the hedged item are offset by an opposite change in value or cash flow of the hedging item. Naturally, a perfect hedge would include a structure composed of instruments, which correlation would amount to minus one. In practice such hedges are hardly observed, among others due to transaction costs.

Correlation between the hedged item and the hedging item may be regarded as correlation between their fair values or as correlation between cash flows generated by of those items. Depending on the type of correlation a distinction can be made between a fair value hedge and a cash flow hedge. In the first case the aim of a hedge is locking in the value of the hedged item, which is exposed to the type of risk hedged against, at a given level. In the second case the hedge is aimed at securing a given amount of cash flows generated by the hedged item, which is exposed to the type of risk hedged against.

2.3. Instruments used for financial risk management in banks

Managing of financial risks, often referred to as assets and liabilities management include particular treatment of different categories of assets and liabilities, and usually involves application of financial derivatives, which enable shortening or prolonging a bank’s exposure to a particular type of risk. Derivatives most commonly used by banks for risk management are the following:

- Interest rate swaps (IRS), which allow swapping fixed interest rates into floating interest rates, also with different re-pricing;
- Cross-currency interest rate swaps (CIRS), where interest rates in different currencies are swapped,
- Foreign exchange swaps, which, being in fact interest rate derivatives, allow banks to manage liquidity in the short run;
- Forward contracts (e.g. currency forwards), except for trading purposes also used for hedging of e.g. general administration contracts denominated in foreign currencies;
- Forward rate agreement (FRA), which enable managing interest rate risk by fixing a future interest rate at a given level;
- Options (e.g. currency options), which if entered into in the inter-bank market may be used for back-to-back hedging of other options written to or purchased from banks’ non-banking customers.
- Credit derivatives (e.g. credit default swaps) which let banks to transfer credit risk to another party.

The fact that banks use derivatives for managing exposures to risks or hedging does not mean that banks are automatically entitled to apply hedge accounting, i.e. presentation of gains and losses on such instruments in a way, which reflects the economic substance of that transaction.

### 2.4. Overview of risk management practices in banks

Risk management is reflected in the organization structure of a bank. Best banking practice requires separation of bank’s units responsible for executing risk management transactions be separated from the back office and risk measurement functions. That rule implicates the organizational division between the bank’s front office, the back office and the risk function. Strategic risk management is outlined by the bank’s Asset and Liabilities Committee (ALCO), which gathers bank’s top management, as well as risk officers and front office officers. ALCO determines strategies of risk management, handles the bank’s capital management (including capital adequacy in accordance with the market regulator’s recommendations), approves and executes risk limits, as well as decides on technical issues connected to risk management (e.g. approves valuation models, processing of transaction data in front office and back office systems). Often ALCO is responsible for handling strategic portfolios of financial instruments (used
either for long-term speculative purposes, or for the purpose of investment of liquid funds (e.g. obtained from gathered deposits - the so-called replication portfolio).

Bank’s financial risk management is usually centralized and operationally executed in the front office. In a big picture, centralization means that financial risks generated by the bank’s commercial areas (retail and corporate operations) are transferred to the central office via a transfer pricing system. The transfer pricing system “purchases” risk from the commercial areas using internal transfer rates in internal (fictitious) deals. The transaction data is collected in a central data warehouse, and next sorted in a way, enabling picking out positions providing a natural hedge. The remaining risk is actively managed in the front office.

Front office is a bank’s unit, where financial operations with banking counterparties are performed. The front office is responsible, among others, for supplying the bank with sufficient liquidity (traders at liquidity desk, for long-term liquidity – also fixed income desk), managing the FX position (FX desk), investing the bank’s resources (fixed income desk) and also generating profits from speculative (trading) operations. Depending on the bank’s strategy and position in the market, a bank may be a market maker, i.e. quote its own prices to other market participants.

The back office (structurally divided from the front office) is responsible for accounting treatment of transactions concluded in the front office. Typical back office activities include: inserting transactions to the accounting system (bookkeeping), confirming transaction terms with the counterparties and executing contractual payments resulting from the transactions.

The middle office is a unit, which, independently of the front office, carries out a control function over trading activities. The control activities include, among others, analyzing traders’ and dealers’ efficiency (via “market conformity” testing), analyzing utilization of pre-settlement and settlement counterparty limits and often reconciliation of the front office’s economic result with the accounting result.

The overall risk exposure of a bank is analyzed in risk monitoring department. Such department is usually divided into market and liquidity risk section and credit risk sections.
With respect to market and liquidity risk, risk monitoring department analyses the utilization rate of market risk limits and liquidity risk limits. The structure of market risk limits should reflect the structure of the bank’s assets and liabilities, i.e. the global market risk limit for the bank should be divided into sub-limits, including limit for strategic portfolios (managed by ALCO), trading and speculative portfolios, and the bank’s investment. Liquidity risk is also managed on the basis of a system of limits for different time buckets. Additionally, emergency plans are prepared for liquidity squeezes and crisis situations.

The risk monitoring department reports to ALCO on any limit breaches and occurrence of warning signals in order to allow the bank’s management to take remedial actions, i.e. closing out risk increasing positions.
3. Capital Adequacy

The information presented in the following chapter is focused on regulation of financial institutions, particularly the issue of capital adequacy. Regulation of financial institutions, especially banks, is aimed at providing banks’ economic environments with security and stability. The primary aim of bank regulations is to prevent commercial banks from going bankrupt. A bankruptcy of a bank, which may be a result of ineffective risk management (e.g. high-levered speculation), affects not only such bank’s shareholders and bondholders, but wide-spreads to the whole economy, including households depositing their savings in banks and other individual and institutional investors. Other negative effects of a bank’s bankruptcy results from systemic risk, which may be defined as a risk that bankruptcy of once bank may lead to other bankruptcies in the economy due to psychological factors, such as bank run\(^\text{21}\).

Presently, regulators of banking sectors in market economies have the following tools, which on one hand secure depositors’ savings, and on the other hand mitigate the systemic risk. The tools applied by regulators are the following:

- capital standards;
- disclosure standards;
- asset restrictions;
- antitrust enforcements;
- conflict rules;
- banking guarantee institutions (funds).

The chapter concentrates on the capital standards–capital adequacy–imposed on banks, and gives an outline of the most recent development in the area of increasing the security of banking systems, i.e. the New Capital Accord (Basel II).

3.1. Regulatory capital

The idea in the background of regulations requiring banks to maintain regulatory capital is to prevent banks’ bankruptcies. Traditional risk management is aimed at mitigating measurable and significant risks. However it should be emphasized, that not all risks inherent to banking activities can be effectively quantified. Thus, a bank’s capital should be sufficient to cover not only expected losses, but also unexpected losses resulting from risks faced by banks. The idea of regulatory capital is that banks should maintain sufficient capital to offset losses due to risks without affecting households’ savings. In the above approach capital plays a role of a “safety buffer”, and increased capital requirement constitutes a “penalty” for the bank for being exposed to greater risk.

3.2. The Basel Accord (1988)

The 1988 Basel Accord was the first attempt towards standardization of capital adequacy of the Banks. The accord was issued by Basel Committee on Banking Supervision, operating within the structures of Bank for International Settlements. The idea standing behind the document (being a list of recommendations and guidelines) was the promotion of transparency and safety of the global financial system. Under Basel I banks were obliged to maintain sufficient capital, amounting to 8 per cent of the bank’s risk-weighted asset (both balance sheet and off-balance sheet items). The main drawback of Basel I was that risk weights were determined arbitrary and mapped to four primary categories of risk. Besides, the 1988 version of Basel I covered only credit risk. In 1996 Basel I was amended. The amendment eliminated several shortcomings of the 1988 version. The most important change was separating banks’ assets into two categories:

- banking book, and
- trading book.

Banking book consists of instruments that a bank intends to hold to maturity, i.e. mainly banks’ commercial activities, such as depository and credit activities. The Trading book consists of banks’ involvement in financial instruments, which a bank intends to hold for
a short period of time, i.e. trading and speculative purposes. The Basel I 1996 amendment introduced additional charges for market risk of the trading book, as well as charges on currency, equity and commodity risks generated by banking book positions. From the hedge accounting point of view, it should be emphasized, that derivatives designated as hedging instruments in hedge accounting, may be treated as banking book instruments. The definition of a bank’s capital featured by Basel Committee on Banking Supervision differs from an accounting definition of equity. Under Basel Accord, capital plays a role of a buffer against banks’ unexpected losses, and therefore has to be permanent. Under Basel I, the following layers of capital may be enumerated:

- Tier 1 Capital (core capital) – consisting of equity and disclosed reserves (i.e. economic gains or losses generated by a bank (e.g. retained earnings), by which equity is increased (or decreased). Tier 1 capital is the most secure layer of capital;

- Tier 2 Capital (supplementary capital) – consisting of balance sheet items, which have to be redeemed by the bank, although subject to certain risk (and thus not being as good a buffer as tier 1). Tier 2 capital usually includes undisclosed reserves, asset revaluation reserves, loan provisions, hybrid equity instruments and subordinated debt.

- Tier 3 Capital (capital for market risk) – consisting of medium-term subordinated debt (with minimum maturity of 2 years). Tier 3 capital is eligible for covering market risk only.

Capital charges under Basel I were based on arbitrary risk weights. Based on those risk weights, an equivalent or risk was calculated and banks were obliged to hold capital covering 8 per cent of risk-weighted assets. Although Basel I was successful in drawing local banking supervisions’ attention to the need of maintaining capital for financial risks in the banking sector, it was not free of

22 Ibidem., p. 645
drawbacks. The most serious one was that under Basel I banks were encouraged to benefit from regulatory arbitrage. The phenomenon of regulatory capital was aimed at reducing the required capital charges by manipulating bank’s lending and borrowing structures in such a way that the regulatory capital gets close to the level of regulatory capital in order to maximize the shareholder value. That may be achieved by increasing the risk of loan portfolios, e.g. by securitization of good loans. The answer to that challenge was brought in the New Capital Accord, which came up with a comprehensive capital and risk management framework.

3.3. The New Capital Accord (Basel II)

The New Capital Accord, commonly known as Basel II, issued by Basel Committee for Banking Supervision in 2003, to a large extent addresses the disadvantages of the 1988 accord. The comprehensive version of Basel II was finally issued in 2006. The idea of Basel II was proposing a regulatory framework, under which regulatory capital would reflect the economic capital and thus eliminated risk of regulatory arbitrage. Basel II is organized in three pillars:

- The First Pillar: Minimum Capital Requirements;
- The Second Pillar: Supervisory Review Process;
- The Third Pillar: Market Discipline

The structure of Basel II framework is presented in Figure 2.3.1.

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23 Idem, p. 642, 658
3.3.1. The First Pillar of Basel II

The First Pillar deals with maintaining minimum regulatory capital for credit risk, market risk and operational risk.

On the contrary to the 1988 accord, for credit risk Basel II does not require banks to use pre-defined risk weights, but offers banks a range of approaches, which banks may apply, depending on their know-how and experience:

- Standardized Approach – which is in fact an extension of 1988 solution, however risk categories are based on external risk ratings provided by rating agencies.
- Foundation Internal Rating Based Approach. Under Foundation IRB Approach banks are allowed to assess credit risk of their debtors using partially internal models. The partiality implies that based on historic data, a bank calculates a
statistical probability of default (PD), and the regulator provides the bank with capital charge for credit risk generated by exposures towards different types of entities, given the PD estimate.

- Advanced Internal Rating Based Approach. In Advanced IRB Approach banks are allowed to estimate other features of their exposure to credit risk, which include loss given default (LGD) and exposure at default (EAD). LGD represents an amount, which will be lost by a bank in case a given debtor defaults. Due to presence of collateral and subordination of such defaulted exposure, LGD can be lower than the maximum exposure. EAD is an estimate of total exposure to risk in case a given debtor defaults\(^{24}\).

Figure 2.3.2 presents a comparison of credit risk capital requirement for a sample loan under Basel I, Basel II Standardized Approach and IRB Approach. As can be seen, the IRB approach guarantees the most accurate mapping of the capital requirement to credit quality of an exposure.

With respect to capital charge for market risk, Basel II allows two approaches: Standardized Method and Internal Models Approach. The Standardized Method does not substantially depart from the 1996 amendment to Basel I. It represents a conservative approach to risk charges, where the total market risk capital charge is equal to sum of charges for all types of market risk: interest rate risk, equity risk, FX risk, commodity risk and options risk. All charges are calculated based on regulatory weights\(^{25}\).

The Internal Models Approach allows banks to independently estimate characteristics of market risks they are exposed to, and based on their own models calculate capital charges for market risk. Nonetheless, implementation of the IMA is subject to meeting regulator’s stringent requirements. Those requirements are the following:

- the bank must have a risk control unit, which is independent of business units involved in trading;
- the measurements of market risk (based on VaR methodology) have to be regularly back-tested;

\(^{25}\) P. Jorion, GARP, Financial Risk… op. cit., p. 686-693
- the bank’s senior management, including the board, has to be actively involved in risk control process;
- models used for risk measurement must be involved in daily risk management;
- the bank must have a system of market risk limits, properly reflecting the structure of bank’s operations;
- the bank is obliged to regularly perform stress-tests, which results have to be approved by senior staff,
- the risk management documentation must be compliant with the bank’s policies, and
- the risk control function should be regularly and independently reviewed\(^26\).

Under Internal Models Approach, market risk charge amounts to the VaR of the previous day (or 60-day average VaR), multiplied by a factor provided by local regulator. In case back-tests prove that measurement systematically understates the risk, the bank is penalized by means of increasing the multiplication factor.

Capital charges for operational risk are an innovation of Basel II. Operational risk was previously considered a non-quantifiable (i.e. non-financial) risk. Under Basel II banks are required to maintain capital for coverage of operational risk, i.e. risk of a loss due to human or systems error. Basel II allows two approaches to operational risk capital charges:

- Basic Indicator Approach, under which banks are required to hold capital for operational risk equal to the average over the previous three years of a fixed percentage of positive annual gross income;
- Standardized Approach, under which the total capital charge is calculated as the three-year average of the simple summation of the regulatory capital charges across each of the business lines in each year. In any given year, negative capital charges (resulting from negative gross income) in any business line may offset positive capital charges in other business lines without limit, and

\(^{26}\) Idem, p. 671-672.
- Advanced Measurement Approach, which allows banks to develop their own models for operational risk assessment (based on empirical data) and apply them for calculating the operational risk capital charge.

It should be emphasized that application of Standardized Approach and particularly Advanced Measurement Approach require meeting certain Basel II and local regulators’ requirements.

### 3.3.2. The Second Pillar of Basel II

The Second Pillar of Basel II is devoted to risks that are not covered by the First Pillar. The Supervisory Review Process featured by Second Pillar gives banking supervisors tools aimed at ensuring that banks have enough capital coverage for credit, market and operational risks (as defined in Pillar One), but also for all other material risks, such as reputation risk, systemic risk, liquidity risk and legal risk. Although the Supervisory Review Process does not give direct outlines how banks should measure those risks, it does encourage banks to develop their own models for modeling, measurement and management of non-financial risks.

With respect to responsibilities of banking supervisors, the Second Pillar gives them tools enabling intervention in case of banks clearly falling below their minimum capital requirements.

### 3.3.3. The Third Pillar of Basel II

The Third Pillar of Basel II, i.e. the Market Discipline, puts an emphasis on risk-related disclosure that banks have to present to market regulators. The Third Pillar gives requirements and recommendations concerning the depth and extent of disclosures, based on which regulators may observe and control banks’ risk profiles, as well as allow or

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forbid banks to apply internal models approaches with respect to calculating capital requirements on given types of risk. The goal of the Third Pillar is providing market participants (other banks, retail and corporate customers) with relevant information on a bank’s performance and risk-taking, and thus increasing the transparency of the global banking system.

### 3.4. Criticism of Basel II

Basel II undoubtedly is a milestone towards developing multi-dimensional models of risk management in the global banking business and a first comprehensive solution, which brings capital requirements and regulatory capital to the level of economic capital actually utilized by banks. Despite the above, the New Capital Accord has been subject to several critical discussions. One of the basic accusations of Basel II opponents is that it restricts the right to adopt sophisticated and risk-sensitive methods of capital requirements calculation for banking institutions, who can afford costly research and development activities. As such institutions are usually huge banking corporations operating in the global market, local and smaller banks are usually forced to apply standardized approaches, which results in more conservative (and thus larger) capital charges on risks. As a result, according to the opponents, Basel II penalizes small and local banks. The above also implies that banks taking advantage of lower capital charges by applying advance risk models, are able to lend to more risky counterparties, thus giving them access to credit, which otherwise would not be available to them.

Finally, advanced risk modeling featured by Basel II usually have a one year time horizon, which means that in case of an economic depression those models estimate the expected losses (due to market and credit risk) at a higher level, which may end up in reduction of exposures to those risks. Globally, the above phenomenon might result in deepening of economic downturns.

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28 P. Jorion, GARP, Financial Risk… op. cit., p. 643
29 A. Yeh, J. Twaddle and M. Frith, Basel II… op. cit., p. 12
4. Accounting for financial instruments and hedge accounting

The chapter presents basic principles of financial instruments accounting in the light of the International Financial Reporting Standards by explaining how different categories of financial instruments are accounted for under International Accounting Standard 39. Further, the chapter depicts the rationale for hedge accounting concept.

4.1. Presentation of financial instruments and the fair value concept

Until the invention of derivatives, most of financial instruments were accounted for at book values, which not always reflected the real or market value. The process of harmonization of accounting standards and development of International Financial Reporting Standards propagated the accruals concept of accounting. Accrual accounting principle implies that revenues and expenses should be accounted for as they actually occur. The concept of fair value and presentation used for accounting for most of financial instruments, including derivatives, first came to life in 1990s. Presently most world-wide accepted accounting standards, including the International Financial Reporting Standards (IFRS), the United Stated Generally Accepted Accounting Principles (US GAAP) as well as most of generally accepted accounting practices of most of capitalist countries, suggest using the “fair value” method of presenting financial instruments.

The fair value is, in most simple words, the value at which the priced transaction may be entered into at the moment of its valuation. Logically, for publicly quoted instruments, their current market values are the closest estimate of their fair value, if only the market is effective. Such prices are usually available for treasury bonds, shares and derivatives quoted in stock exchanges. Nevertheless, it should be mentioned that most of derivative transactions entered into by banks are non-standardized instruments, traded “over the counter” (OTC), which price is subject to negotiations between the transaction parties each time such instruments are purchased or sold. For OTC derivatives no regulated
market exists, and therefore their fair value should be estimated based on mathematical valuation models. For all derivatives mentioned above commonly used valuation models are available. Most of the models used for valuation of FX forwards, FX swaps, IRS, CIRS and other non-option derivatives are based on the net present value (NPV) theory and the underlying general concept of “time value of money”. Contingent financial instruments, as options and compound financial derivatives, are valued with models based on statistical approach, usually with the formula designed in 1970s by Black, Merton and Scholes, or its modifications.

4.2. Accounting mismatch in presentation of derivatives used for hedging purposes

Most accounting standards require that derivatives be presented at fair value through profit or loss, i.e. each change of the fair value should be recognized in the bank’s income statement. Financial instruments’ fair value should be measured at least on each balance sheet date in order to ensure the fair value presentation in the financial statement. It is important to mention that such approach to accounting for derivatives is useful for banks’ portfolios managed on a fair value basis—particularly the trading book. However, the hedging of the assets and liabilities in the banking book is often aimed at changing the risk structure of the banking book in the future. This implies that presentation of hedging derivatives at fair value through profit or loss may be misleading to financial statements’ readers. This is because often derivatives are often used to hedge recognized assets and liabilities carried at amortized cost, not at fair value, or at fair value with gains and losses recognized in equity or forecast transactions or firm commitments. In such cases the effects of hedging activities are reported in a different time and/or under a different financial statement caption. The above described mismatch in gain or loss recognition makes the effect of hedging unrecognizable for financial statement readers and hedging strategies applied by banks may be unclear to them. Another words, through the information effect of financial statements, the accounting mismatch occurring in hedging activities hinders the creation of shareholder value, which should be the bottom line for all financial managers.
4.3. The hedge accounting concept in the light of International Accounting Standard 39

Hedge accounting is a concept, which seeks to reflect the economic sense of hedging activities in an entity’s financial statement and is aimed at the creation of value to the entity’s shareholders, by providing them with an insight to the entity’s risk management. Under International Accounting Standard 39 (IAS 39), which is a standard dealing with all financial assets and financial liabilities, including loans, borrowings, derivatives, receivables and payables, as well as equity investments in other entities, hedge accounting is treated as a privilege, which may be achieved by an entity after completion of criteria quoted by the standard. Hedge accounting allows an entity to override the standard accounting treatment of derivatives, i.e. presentation at fair value through profit or loss, or to adjust the carrying value of hedged items of financial assets or financial liabilities.

4.4. How banks may take advantage of hedge accounting

Banks may profit from hedge accounting in a number of ways. This is because banks commonly use derivatives to limit their exposures to financial risks using derivatives, which is a typical part of their activities. Activities of universal and commercial banks are usually concentrated on granting loans and taking deposits. The mismatches in the re-pricing terms, interest rates and currencies are the main source of financial risk in such activities. Those risks are usually hedged against using derivatives. As IAS 39 required loans and deposits to be accounted for at amortized cost and are not fair valued, the above described accounting mismatches resulting from the use of derivatives have usually a strong impact on hedging banks’ income statements, which become more volatile. Such volatility may be negatively perceived by the market, although it does not result from business risks of the banking operations. Therefore, hedge accounting may be especially useful for banks, which use derivatives in order to hedge against financial risks occurring from their lending and borrowing businesses.
4.5. Other accounting concepts reducing the accounting mismatch (FVO, AFS)

Coming across the needs of entities, who encounter accounting mismatches in their risk management practices, IFRS offers two other accounting privileges, in addition to hedge accounting. These are Fair Value Option (FVO) and a possibility to designate a financial asset to the available for sale category (AFS).

The first concept is based on a designation of a financial asset or a financial liability being subject to hedging and presented at amortized cost to presentation at fair value through profit or loss. As a result, the valuation gains and losses on a financial asset or a financial liability designated to FVO is offset by the reverse valuation gain or loss recorded on the derivative being the hedging item and the volatility of profit and loss account is eliminated.

In case of designation of a financial asset to the AFS category the volatility of profit and loss account is eliminated due to the fact that the fair valuation result recorded on such asset is recycled through equity (i.e. a revaluation reserve is created, which either increases or decreases the bank’s equity. In such situation equity plays a role of a buffer, by absorbing losses incurred on the valuation of the AFS portfolio.

As in case of hedge accounting, designation of financial assets to AFS category and/or financial liabilities to FVO category is subject to several requirements set out in IAS 39.
5. Types of hedges in the light of International Accounting Standard 39

This chapter presents basic information on types of hedge accounting types applicable under the IFRS.

5.1. Macro hedges and micro hedges

Banks may choose either to hedge a selected asset or liability item against financial risks, or to hedge a whole portfolio of assets. The first case one may call a micro hedge, whereas the second case may be described as a macro hedge. The importance of the differentiation is vital from the technical point of view, as it determines the approach to effectiveness testing of the hedge.

For micro hedges, effectiveness testing is usually based on verification, whether the change in the fair value of the selected hedged item is strongly negatively correlated with the change in the fair value of the hedging item or, to put it another words, whether the recorded gains or losses on the hedging item were offset by the change in the fair value of the hedging item.

For macro hedges, effectiveness should be measured based on a portfolio approach, i.e. changes in fair values of portfolios of hedged items and hedging items need to be investigated respectively.

Although the difference between macro and micro hedges seems to be not remarkable, it is important, when a given economic hedging relationship is designated to hedge accounting in the light of IFRS.

5.2. Cash flow hedge accounting

A cash flow hedge is a type of hedge, where a stream of cash flows from the hedged item is offset by an opposite stream of cash flows generated by the hedging item. Cash flow
hedge accounting seeks to offset certain types of risk of variability of cash flows generated by the hedged item, which is an existing asset or liability, or a highly probable transaction\textsuperscript{30}. It is important to mention that the cash flows of a highly probable future transaction must be reflected in the entity’s profit or loss in a future period. In a cash flow hedge (as shown in Figure 5.1), the hedging instrument is measured under standard IFRS principles (i.e. at amortized cost), however any changes in its valuation, which are determined to be an effective hedge, are recognized in equity\textsuperscript{31}. Thus, the entity applying cash flow hedge accounting avoids increase in the volatility in its profit or loss in the period, when gains or losses on the hedges item are not recognized in profit or loss.

Figure 5.1
Cash flow hedge accounting

\textsuperscript{30} IAS 39.86
\textsuperscript{31} IAS 39.95-96
5.3. Fair value hedge accounting

The goal of fair value hedge accounting is to offset the risk of changes in fair value of an existing asset or liability or an unrecognized firm commitment, which may increase the volatility of the entity’s profit or loss\(^{32}\). In a fair value hedge (see Figure 5.2), the changes in fair value of the hedged item and the changes in fair valuation of the hedging instrument are presented under the same caption of the income statement, which enables the entity to reduce profit or loss variability attributable to hedged risks\(^{33}\). This is because the fair value changes in of the hedged item and the hedging instrument will offset and result in null net impact on the profit or loss.

![Figure 5.2](image)

**Figure 5.2**
Fair value hedge accounting


\(^{32}\) IAS 39.86

\(^{33}\) IAS 39.89
5.4. Net investment hedge accounting

Net investment hedge accounting may be used by entities in foreign operations, in case when they are exposed to changes in carrying amount of the net assets of foreign operation\textsuperscript{34}. The change of the “net investment” is due to the fact that accounting-wise all assets and liabilities need to be translated to the functional currency (i.e. the currency, in which the entity’s books are kept). It is important to mention that net investment hedge accounting is not applicable to preparation of consolidated financial statements, where net assets of subsidiaries are translated to the parent’s functional currency.

\textsuperscript{34} IAS 39.102
6. Criteria of hedge accounting application in the light of International Accounting Standard 39

The chapter presents hedge accounting theory in the light of IAS 39 requirements. The standard lists a number of requirements, which have to be met when hedge accounting is applied, concerning hedged items, hedging instruments and hedge effectiveness, as well as formal documentation of hedge accounting.

6.1. Hedged items

In general, IAS 39 allows designation of the following to hedge accounting:

- A recognized asset or liability;
- An unrecognized firm commitment
- An uncommitted but highly probable anticipated future transaction (a forecast transaction)
- A net investment in a foreign operation.\(^{35}\)

It is also allowed under IAS 39 to designate group of each above hedged items to hedge accounting, however under the condition, that the group components share the same risk. Besides, if a portfolio hedge is designed to protect against interest rate risk only, it is possible to designate a portion of such portfolio to hedge accounting.

The most important principle of designating an item to hedge accounting is that the risk being hedged must be identifiable, i.e. can be separated from the overall risk of such item. The above is important from the effectiveness, as well and accounting treatment viewpoints.

\(^{35}\) IAS 39.78
IAS 39 generally precludes derivatives from being designated as hedged items. The only exception to the rule is a written option, embedded and closely related with another non-derivative instrument, which may be designated as a hedged item in a fair value hedge.

**6.2. Hedging instruments**

Instruments designated in hedge accounting as hedging instruments are generally derivatives. IAS 39 allows an exception with respect to currency risk hedges, where non-derivative instruments may be designated as hedging instruments. This is because an entity may effectively hedge its foreign operations related exposure to foreign exchange rate risk with a non-derivative monetary item, e.g. foreign exchange cash balance, which offset that exposure.

Derivatives, which are most often used as hedging instruments in hedge accounting, include:

- Forward and futures contracts;
- Swaps;
- Options;
- Compound derivatives.

**6.3. Hedge effectiveness and effectiveness measurement**

IAS 39 requires that a hedging relationship designated to hedge accounting need to be effective, i.e. the offsetting effect of the hedge has to be relevant. Effectiveness must be possible to be reliably measured. At inception of hedge accounting, the entity must clearly define methods, which will be used for testing hedge effectiveness. Although IAS 39 allows a certain degree of latitude in choice of effectiveness testing methods, it is required that the following criteria be met:

- At inception of the hedge and in subsequent periods, the hedge is expected to be highly effective in achieving offsetting changes in fair value or cash flows.

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36 IAS 39.72
attributable to the risk being hedged against, during the period for which the hedge is designated;

- The actual results of the hedge are within a range of 80 to 125 per cent\(^{37}\).

Although the Standard does not explicitly state, how the range of 80 to 125 per cent should be interpreted, it seems clear, that the correlation between changes of fair values or cash flows of the hedges item and the hedging instrument should stay within the range mentioned.

The entity applying hedge accounting should not only assess high hedge effectiveness at inception of the hedge, but also perform prospective effectiveness tests (i.e. assess whether the hedge should be effective in the future periods) and retrospective tests (i.e. prospective tests should be re-performed \textit{ex post}).

For micro hedges effectiveness may be tested using fair valuation results for the hedging instrument and the hedged item. For a portfolio hedge, it may be difficult to assess the fair value of the portfolio at the moment, when effectiveness is tested. In such cases the Standard allows application of the \textit{hypothetical derivative} method. In the method, a portfolio of hedged items is presented as a hypothetical derivative, i.e. all cash flows generated by the portfolio are valued, as if they were generated by a single derivative instrument (e.g. an Interest Rate Swap).

### 6.4. Accounting treatment of hedge accounting

The main win of entities using hedge accounting is a possibility of presenting valuation of hedged items and hedging instruments in a way, which reduces the volatility of those entities’ profit or loss.

For fair value hedge accounting, the offsetting effect of hedge accounting is achieved through presentation of gains and losses on valuation of the hedged item under the same caption of income statement as gains or losses from the valuation of hedging instruments.

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\(^{37}\) IAS 39.AG 105
In case of cash flow hedges, the effective portion of valuation of the hedging instruments is recycled through equity, the same reducing the profit or loss volatility.

6.5. Formal hedge accounting documentation

Hedge accounting has to be formally documented at inception. Hedge accounting documentation prepared in accordance with IAS 39 should contain:\(^{38}\):

- Description of the entity’s risk management objectives and strategy for applying hedge accounting;
- Description of the risk being hedged;
- Type of hedge accounting to be implemented;
- Identification of the hedged item and the hedging instrument;
- Description of methods for assessing prospective hedge effectiveness and measurement on an ongoing basis.

All results of hedge effectiveness tests also have to be formally documented.

\(^{38}\) IAS 39.88
7. Hedge accounting in banks in practice

The following chapter presents case studies of application of hedge accounting in banks, based on author’s professional experience. The below described applications of hedge accounting were implemented by a Polish bank. The chapter provides a short background information on the bank and analyzes three cases of hedge accounting application with emphasis put on benefits achieved by the Bank, as well as the fulfillment of IAS 39 requirements.

7.1. Background information on the analyzed bank

The below chapter is devoted to practical aspects of hedge accounting in universal banks. The chapter presents a case study of hedge accounting application in a Polish Stock Bank preparing its financial statement in accordance with the IFRS. The Bank is a typical universal medium-sized bank operating in the Polish economy and a subsidiary of a medium-sized European Banking Group. The scope of the Bank’s operations includes typical banking activities in the retail and commercial areas (depository products, credit products) and is active in the financial markets, including both trading activities (for risk management and liquidity maintenance, and to a limited extent also speculation) and sales activities (currency dealing—spot, forward, options), intermediation in the fixed-income market (mainly Polish treasury bonds and bills), interest rate derivatives sales and compound investment products (deposits and certificated with embedded currency, commodity and equity options).

The majority of derivative positions in the Bank are maintained either due to strategic reasons or for hedging of financial risks arising from the Bank’s commercial activities. Several financial risks resulting from the Bank’s commercial activities are mitigated through back-to-back hedging. Such approach is applied to, among others, currency options (the bank has no permission from its parent for holding open currency options exposures), commodity forwards and options (similarly to currency options, the Bank is not permitted to trade in commodities) and structured products (deposits with embedded
equity or commodity options; for such instruments the Bank “purchases” the exposure from banking institutions in structured IRS, where one leg is the exotic derivative and the second leg represents the financing of that derivative’s, and the exotic derivative is “sold” to the Bank’s retail or corporate customers as derivative embedded in a depository product).

Other areas of the Bank’s operations (exposing the Bank to financial risks) are economically hedged against financial risks with derivatives. Accounting-wise, clients’ deposits and loans, are not entitled to presentation at fair value through profit or loss under the IFRS, whereas derivatives used to hedge interest rate of currency risk generated by those products are marked-to-market. The above is a source of accounting mismatch and exposes the Bank to a risk of increased profit and loss volatility. Simultaneously, the accounting mismatch is an encouragement to the Bank towards hedge accounting application.

The bank has applied hedge accounting of foreign exchange rate risk and interest rate risk both with respect to its general administration expenses (future foreign exchange denominated payments resulting from rental and lease contracts), with respect to its commercial activities (macro cash flow hedge of floating foreign-exchange denominated mortgage loans) as well as with respect to the Bank’s strategic investment (micro fair value hedge of fixed-coupon Eurobonds).

### 7.2. Micro fair value hedge of FX and interest rate risk of AFS Eurobonds

The first case study presents application of fair value hedge accounting of interest rate risk as well as currency risk of Eurobonds designated to presentation as available for sale, with cross-currency swaps as hedging instruments. Similar hedges are commonly used in banking institutions in Poland.
Hedged item

The hedged items are Eurobonds issued by a Polish telecommunication corporation and denominated in EUR and USD. Maintenance of those bonds exposes the Bank to the following risks:

- interest rate risk (the bonds are fixed-coupon ones),
- currency risk (both coupons and principal are denominated in foreign currencies),
- credit risk (issuer’s default risk), and
- liquidity risk (as Polish market for corporate securities is strongly underdeveloped in comparison with other European countries, it might be difficult to pursue large transaction in such securities at a desired price).

Among the listed risk factors, the Bank is in position to apply derivatives in order to hedge currency risk and interest rate risk. The fact that the bonds are presented as available for sale means that they are accounted for at fair value (i.e. they are marked-to-market), however the changes in carrying value of the bonds due to their valuation are recycled through equity and presented as revaluation reserves. The foreign exchange revaluation of the bonds is presented in the income statement under FX result caption.

Hedging instruments

In order to hedge currency risk and interest rate risk of Eurobonds, the Bank needed instruments that both swap fixed interest rate to floating rate (to offset the valuation effect of marking-to-market due to changes of market interest rates), and provide an offset to the changes in value of bonds due to foreign exchange revaluation. The Bank applied cross currency swaps as instruments hedging against both risks. The chosen swaps have the same notional amounts as bonds, same re-pricing periods and swap fixed interest rates in EUR and USD for floating PLN rate (3M WIBOR).

Accounting mismatch

Due to the fact that the valuation of bonds with respect to interest rate is recycled through equity, in case hedge accounting was not applied, the Bank would suffer from an accounting mismatch. The mismatch occurs in the Bank’s profit or loss and results from
the fact that CIRS, which economically hedge bonds are presented as trading instruments in accordance with IAS 39, while their fair valuation (including valuation due to changes in interest rates and foreign exchange rates) is presented in the Bank’s profit or loss. Application of fair value hedge accounting allows the Bank to present the valuation of the hedged item (with respect to risks being hedged) and the valuation of the hedging instrument to be presented in profit or loss, provided the hedge is effective.

**Type of hedging relationship**

As the accounting mismatch regards valuation gains and losses of the bonds, an applicable type of hedge is fair value hedge accounting. IAS 39 AG 102 allows designation of fixed-coupon securities to fair value hedge accounting. It should be mentioned that foreign exchange revaluation of the bonds is presented in profit or loss.

**Hedge effectiveness**

The Bank measures the effectiveness of the fair value hedge by confronting the changes in the fair value of the hedging instruments and the hedging items. It should be emphasized that the price of the hedged bonds is affected not only by currency risk and interest rate risk, but also by other factors. That means that the total valuation effect of bonds valuation should be split respectively into portions attributable to risks being hedged (interest rate risk, currency risk) and other risks. The Bank achieves that goal by applying the following valuation algorithm:

- firstly the Bank values the bonds with respect to interest rate changes. For that the Bank prices the bond with market zero-coupon interest rates (EUR and USD respectively). The achieved effect is equal to the bonds’ valuation with respect to interest rate risk;
- secondly the Bank calculates the foreign exchange revaluation result on the bonds, applying rates quoted the Polish central bank;
- next the Bank calculates the credit end liquidity risk premium on the security. For that purpose the Bank increases the market zero-coupon interest rate curve (with which the security was initially priced) by a spread reflecting the credit and liquidity risks of the bond, estimated based on market data.
Knowing the portion of the bonds’ valuation attributable to risks being hedged, the Bank may measure the change in the fair value of the hedged items due to hedged risks in the period for which effectiveness is being tested. This change is then compared with the change in fair valuation of the hedging instrument. Should the offsetting effect of the hedge be within the range of (80%; 125%), the hedge is effective.

**Accounting treatment**

According to IAS 39.89, in a fair value hedge, the change in fair value on the hedging instruments should be presented through profit or loss. If the hedged item is presented at cost or as an available for sale asset, the portion of its fair valuation attributable to risks being hedged should also be presented through profit or loss. In the analyzed case, the Bank presents the valuation of the hedging CIRS and the valuation of the hedged bonds in the profit or loss, simultaneously eliminating the previously mentioned accounting mismatch. The portion of the hedged bonds valuation attributable to credit and liquidity risk is presented in the AFS revaluation reserve in the Bank’s equity.

### 7.3. Micro fair value hedge of FX risk attributable to future contractual currency payments

The following case is not a typical hedge accounting application for a bank. In this hedge the Bank hedges items, which are often encountered in banks, though not directly connected to the banking activity. In its general administration expense, the Bank has certain positions, which expose the Bank to foreign exchange rate risk. These are payments due to long-term contracts denominated in foreign currencies, which the Bank concluded with providers of services (mainly IT) and lease contracts for premises (e.g. for the Bank’s branches).

The Bank hedges the currency risk attributable to future and foreign exchange denominated payments with basis swaps, i.e. cross-currency swaps with “capital reset” or re-pricing. Below a general analysis of the hedge accounting is presented with respect to IAS 39 compliance.
Hedged item
IAS 39.9 allows application of hedge accounting for firm commitments, i.e. a binding agreement of the exchange of specific quantity of resources at a specified price on a specified future date or dates. Future and foreign exchange denominated cash outflows fulfill the above criteria. It should also be mentioned that the Bank has a number of rental agreements and analyzes them in bulk. Such approach to hedge accounting is allowed, however only provided that the outflows result from already concluded contracts, not from forecasted transactions. The latter may be also be designated to hedge accounting, but when analyzed separately under cash flow hedge accounting.
Because rental and lease agreements are not financial items, in order to assess their eligibility for hedge accounting, IAS 39.82 should be analyzed. The respective paragraph states that a non-financial asset of non-financial liability may be designated as a hedged item only against foreign exchange rate risk, or in the entirety of its risks\(^{39}\). Due to the fact that the Bank cannot measure all risks resulting from rental payments (e.g. price risk), it was decided to hedge currency risk only in accordance with IAS 39.82.

Hedging instruments
As it was mentioned above, the Bank designated CCS (basis swaps) as hedging instruments. A basis swap is an OTC instrument, which both legs generate cash flows based on floating reference rate over a notional amount, in two different currencies. The notional amount is re-priced with FX spot rate on each cash flow date and may be amortized using different amortization schemes. Basis swaps fulfill the IAS 39.72 requirement, which accepts only derivatives as hedging instruments. Swaps concluded by the Bank swap 3-month WIBOR to 3-month floating reference rates of currencies, in which the agreements are denominated (EURIBOR, CHF LIBOR, USD LIBOR and SEK LIBOR).

\(^{39}\) The interpretation of IAS 39.82 may be such, that it is difficult to measure the influence of given risk sources on flows or value of a non-financial assets and non-financial liabilities – on the contrary to financial assets and financial liabilities.
Type of hedging relationship
The exposure related to future contractual payments creates a risk exposure of two natures: the Bank is exposed both to changes of foreign exchange rates in the future and to the risk of changes in future cash flows. The latter is because an agreement is a firm commitment from IAS 39 perspective. The Bank’s intention was to hedge the exposure to foreign exchange risk. In accordance with IAS 39 AG 104, a hedge of a firm commitment is a hedge of an exposure to changes in fair value, therefore the hedge should be treated as a fair value hedge.\(^{40}\)

Hedge effectiveness
According to IAS 39 AG 105 a hedge may be regarded as highly effective if, at inception and throughout the life time of the hedge, the Bank can expect changes in the fair value or cash flows of the hedged item that are attributable to the hedged risk, to be almost fully offset by the changes in the fair value or cash flows on the hedging instrument, and actual offsetting effect is in a range of 80-125 per cent in retrospective effectiveness tests. Also, in accordance with IAS 39 AG 106, there is a requirement that effectiveness be tested at a minimum for the date of financial statement preparation. In the analyzed case prospective assessment of hedge effectiveness, as well as retrospective effectiveness testing seems fairly easy provided that the basis swaps designated as hedging instruments are structured in a way similar to the hedged item (i.e. the re-pricing dates of swaps as well as notional amounts reflect the payment structure). The Bank tests the effectiveness of the hedge on a monthly basis, by confronting the changes in fair value of the stream of future payments with respect to foreign exchange rate changes with changes in fair valuation of the hedging items. It is crucial for the effectives that the structure of payments and notional amounts of the hedged agreements do not change over the life time of the hedge. Otherwise, such a change would cause low effectiveness and might result in early termination of hedge accounting.\(^{41}\) The Bank on a monthly basis monitors all agreements

\(^{40}\) Alternatively such hedge may also be treated as a cash flow hedge in accordance with IAS 39.87, however that is not applicable in the presented case study.

\(^{41}\) IAS 39.91, IAS 39.101
and additionally mitigates the above risk by structuring the swaps’ amortization scheme in a way, which takes into account maturities of given agreements.

**Accounting treatment**

In accordance with IAS 39.93 when an unrecognized firm commitment is designated as a hedged item in fair value hedge accounting, the subsequent cumulative change in fair value of that commitment attributable to the hedged risk is recognized as an asset or liability with corresponding gain or loss recognized in profit or loss. Complying to the above the Bank recognizes FX spot revaluation of the firm commitments as an asset or liability in correspondence with a P&L account, while hedging instruments are accounted for at fair value through profit or loss. The advantage the Bank achieves from the hedge accounting is the IAS 39 “privilege” of presenting the valuation results on the hedged item and the hedging instrument under the same caption of the income statement (general administration expenses), which clearly eliminates the P&L volatility due to FX spot revaluation of future payments, which would otherwise volatilize the foreign exchange result.

### 7.4. Macro cash flow hedge of risks attributable to a portfolio of floating CHF denominated mortgage loans and floating PLN deposits

In the third hedging strategy the Bank designated to hedge accounting two hedged items: a portfolio of floating, foreign exchange denominated (CHF) mortgage loans and a portfolio of rate deposits denominated in PLN. The relation between the two items is based on the fact that the Bank finances granting of the loans portfolio with deposits placed with the Bank by retail customers. The average expected maturity of mortgage loans exceeds 10 years and interest is payable monthly. Due to the portfolio the Bank is exposed to variability of CHF denominated cash flows, attributable to interest rate risk and currency risk. The deposits are usually fixed-rate ones, with maturities ranging from one week to three months, with average maturity of one month, which roll over time. As the depositary base
is fairly stable, in the long run the deposits portfolio creates an exposure similar to a PLN floater with coupon period approximately equal to the principal-weighted duration of individual deposits constituting the portfolio, which on average equals one month. As a result, the Bank is exposed to variability in cash flows attributable to PLN interest rate risk.

The Bank hedges against the variability in cash flows attributable to interest rate and foreign exchange risks by swapping CHF denominated payments to PLN using basis swaps, i.e. currency interest rate swaps (CIRS), where one leg is a deposit yielding floating rate coupons in PLN and the second leg is a loan with CHF floating coupons payable. The Bank has entered into several basis swaps (covering the principal amounts of loans and deposits in part financing the loans portfolio). In the transactions the Bank pays 1-month CHF LIBOR and receives 1-month WIBOR. Economically, basis swaps enable the Bank to link CHF denominated interest payments on loans with interest expense paid on PLN deposits. To the described structure the Bank applies cash flow hedge accounting. The purpose of hedge accounting application was to reflect the economic sense of the hedging relationship by reducing the accounting mismatch, which results from the fact that the whole valuation of CIRS (mark-to-market and interest accruals) are presented in trading result, whereas corresponding interest on loans was presented in interest margin. By using cash flow hedge accounting the Bank can present interest on CIRS in the same profit or loss caption as interest on the hedged items, and simultaneously to present mark-to-market of CIRS due to variability of cash flows in equity.

Hedged items

In accordance with IAS 39.78 a hedged item can be a recognized asset or liability, an unrecognized firm commitment, a highly probable forecast transaction or a net investment in a foreign operation, or a portfolio of one of the above. As far as mortgage loans are concerned, they constitute a group of recognized assets with similar risk characteristics and may be designated as a hedged item. As far as PLN deposits are concerned, it is worth mentioning that not only the existing deposits (i.e. recognized items) are designated to hedge accounting, but also the deposits, which will be placed
with the Bank in the future (when the existing deposits roll over), which are in fact forecast transactions. The deposits share the risk profile, and can be designated to hedge accounting as a hedged item. However, in accordance with IAS 39 AG F 6.2 the Bank has to prepare a cash flow maturity schedule proving that there exists a sufficient aggregate gross level of expected cash flows to cover the inflows on CHF loans. Such schedule should be supported by the Bank management’s stated intentions and past practice in refinancing cash outflows.

According to IAS 39.81 if the hedged item is a financial asset or a financial liability, it may be hedged only with respect to the risk associated only with the portion of its cash flows provided that the effectiveness can be measured. In the case the respective reference rates—CHF LIBOR and WIBOR—represent this portion.

**Hedging instruments**

According to IAS 39.72 if all hedge criteria are met, the float-to-float CIRS can be designated by the Bank as hedging instruments. As presented in IAS 39 AG F 6.2, an entity may designate a derivative used for interest rate risk management as a hedging instrument in cash flow hedge accounting of a recognized asset, recognized liability and forecast transaction. Consequently, basis swaps are eligible for being designated to hedge accounting under IAS 39.

**Hedged risks**

In the analyzed structure the Bank designates as hedged risks the exposure to variability in cash flows attributable to foreign exchange risk and interest rate risk due to mortgage loans and deposit. Margins on the hedged items (both on the deposits and on loans) should be excluded from the risk designation.

**Type of hedging relationship**

In accordance with IAS 39.86 the Bank may hedge the exposure to variability in cash flows that is attributable to a particular risk associated with a recognized asset or liability or highly probable forecast transaction provided that this variability could affect the profit or loss. IAS 39 AG F 2.18 gives an example of a hedge, where an entity has an existing
asset yielding a rate indexed to the reference rate of one leg of a swap, and an existing liability including roll-over of that liability bearing interest equal to the reference rate of the second leg of that swap. As a consequence, it may be stated that under IAS 39 only an existing asset and an existing liability including roll-over may be designated to hedge accounting and the appropriate hedge accounting model is a cash flow hedge.

**Additional analyses**

The designation of the above described structure to hedge accounting required the Bank to pursue further analyses required by IAS 39. With respect to PLN deposits, the Bank needed to prepare an analysis aimed at demonstrating high historical and expected future correlation between the interest rate risk of the deposits and the interest rate risk of the hedging item (PLN WIBOR).

Further additional analysis was aimed at proving that the future expected level of deposits would be sufficient to cover the interest inflows generated by the hedging instrument, taking into account the re-pricing of swaps. In order to satisfy the above condition, the Bank carried out a historical analysis, in which, based on the historical time series of deposit volumes, the core portion of deposits was established with a high confidence level. Only the core part can be designated as a hedged item under the IFRS.

With respect to mortgage loans the Bank had to analyze the expected effect of prepayments, i.e. a probability of occurrence of a situation, where customers early prepay outstanding loans (e.g. as a result of refinancing in another bank).

**Accounting treatment**

Under IAS 39 cash flow hedge accounting against the variability of cash flows requires the following accounting treatment in accordance with paragraph 95:

- the portion of the gain or loss on the hedging instrument that is determined to be an effective hedge shall be recognized directly in equity through the statement of changes in equity
• the ineffective portion of the gain or loss on the hedging instrument shall be recognized in profit or loss.

More precisely, IAS 39.96 requires that the separate component of equity associated with the hedged item is adjusted to the lesser of the following (in absolute amounts):

• the cumulative gain or loss on the hedging instrument from inception of the hedge; and

• the cumulative change in fair value (present value) of the expected future cash flows on the hedged item from inception of the hedge;

• any remaining gain or loss on the hedging instrument or designated component of it (that is not an effective hedge) is recognized in profit or loss.

The above means that the ineffective portion of valuation of CIRS should be posted directly to the profit or loss, as only the effective portion of valuation of the hedging instrument may be recycled through equity.

The profit or loss effect of cash flow hedge accounting is presenting by the Bank interest on cross currency swaps (for which an effective hedging relationship exists) in the same profit or loss line as the interest on hedged items, i.e. the interest margin on loans and deposits. As a result, the accounting mismatch is eliminated.

**Hedge effectiveness**

IAS 39.88b requires that at inception a hedge is expected to be highly effective in achieving offsetting changes in fair value of cash flows attributable to the hedged risk in consistence with the originally documented risk management strategy for the hedge relationship. The Bank may expect such effectiveness if critical terms of hedged items and hedging instruments (notional amounts, dates and interest rates) are matched. IAS 39 AG F 6.2 gives an example of demonstration of expected high future effectiveness based on historical analysis. Prospective hedge effectiveness assessment should confirm that in accordance to the Bank’s best knowledge there are highly probable future cash flows generated by the hedged items (loans and deposits) sufficient cover all future cash flows
generated by the hedging instrument. Such test should be prepared with respect to all future time buckets, for which hedge accounting is expected to last. Hedge effectiveness should also be measured retrospectively (at least on each balance sheet date) in order to confirm or reject the prospective hypothesis regarding the future effectiveness.

For that purpose the Bank applies an approach called “hypothetical derivative method” featured in IAS 39 AG F 5.5. The method allows approximate calculation of the valuation of the hedged items with respect to the risks being hedged. For that, a “hypothetical derivative” is created, encompassing all expected cash flows generated by the hedged item, i.e. the loans and the deposits. The stream of payments form a stream of inflows (loans) and outflows (deposits), which may by valued with respect to interest rate risk and foreign exchange risk. It can be seen that such “derivative” is similar to a basis swap. The change in valuation of such “hypothetical derivative” in the period for which effectiveness is tested is confronted with the valuation of the hedging CIRS in the same period. In accordance with IAS 39 AG 105b, a hedge is considered effective if the offsetting effect, measured by changes of fair valuations of the hedged item and the hedging instrument is in the range between 80 per cent and 125 per cent.
8. Summary - conclusions and areas for further research

By presenting the assumptions of hedge accounting concept in the light of the IFRS and, based on case studies, the thesis identified certain areas, where hedge accounting may be applied in financial institutions. In an attempt of drawing general conclusion from the presented material, it may be said that hedge accounting is an effective concept of accounting presentation of risk management activities in banks.

In the theoretical part of the thesis risk faced by banks in their activities, as well methods of their measurement and mitigation were presented. A brief description of New Capital Accord was provided, as a framework aimed at keeping those risks within a safe range. To certain extent the assumptions of the New Capital Accord allows the distinction between banks’ core activities and risk management activities, although it does not regulate the way of disclosing the information on risk management activities in the financial statements.

The empirical part of the thesis shows how banks may reveal the economic sense of their risk management activities by means of application of hedge accounting in the light of the International Financial Reporting Standards, and thus disclose to the market information to a significant extent free from accounting mismatches.

The three case studies of application of hedge accounting in a universal bank proved that hedge accounting in the light of International Financial Reporting Standards may be successfully applied in banks. The case studies depict hedge accounting application for the following areas of banks’ operations:

- depository and credit activities;
- strategic investment;
- general administration.
Analyses carried out include feasibility of hedge accounting application with respect to IAS 39 requirements for the three areas, as well potential gains a bank may achieve as a result of hedge accounting application.

Based on both presented considerations and practical examples, it can be concluded that the aim of the thesis was achieved. As can be seen in the empirical part, application of hedge accounting in banks reduces accounting mismatches resulting from different accounting treatment of financial instruments categories under the IFRS. It also eliminates the volatility in the income statement, thus reflecting the economic sense of hedging. Consequently, the goal of the thesis was achieved.

The following steps, suggested for further studies on hedge accounting, its application and impact on financial institutions should involve research on whether hedge accounting application impacts the shareholder value of banks. The impact of hedge accounting on creation of value for banks shareholders was scoped out of the thesis due to obstacles in collating applicable data, as well as due to difficulties in designing a research model. It seems that methodologies applicable to such research could be quantitative event study model with a series of assumptions regarding treatment of available data.
Literature

International Financial Reporting Standards (IFRSs) including International Accounting Standard (IASs) and Interpretations as at 1 January 2006, International Accounting Standards Board, 2004


