

# Financial Securities (2UZB605)

## Week 4:

- Derivatives

# Porsche takeover attempt of VW

**Learn about how Porsche attempted to take over VW, which is 60 times bigger !**

**Read the story here:**

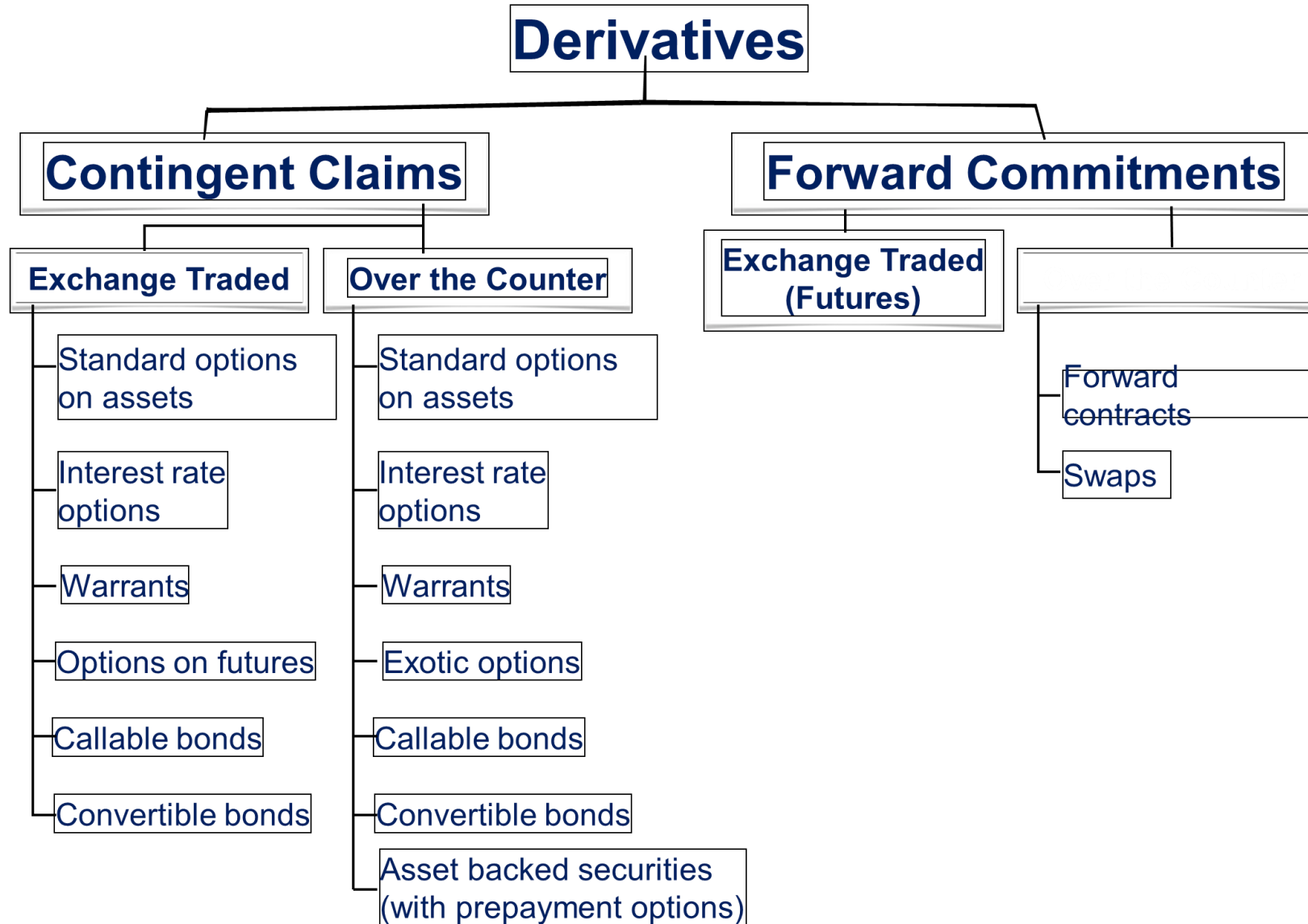
**Short version for dummies:**

<http://www.automobilemag.com/news/porsche-and-volkswagen-what-happened/>

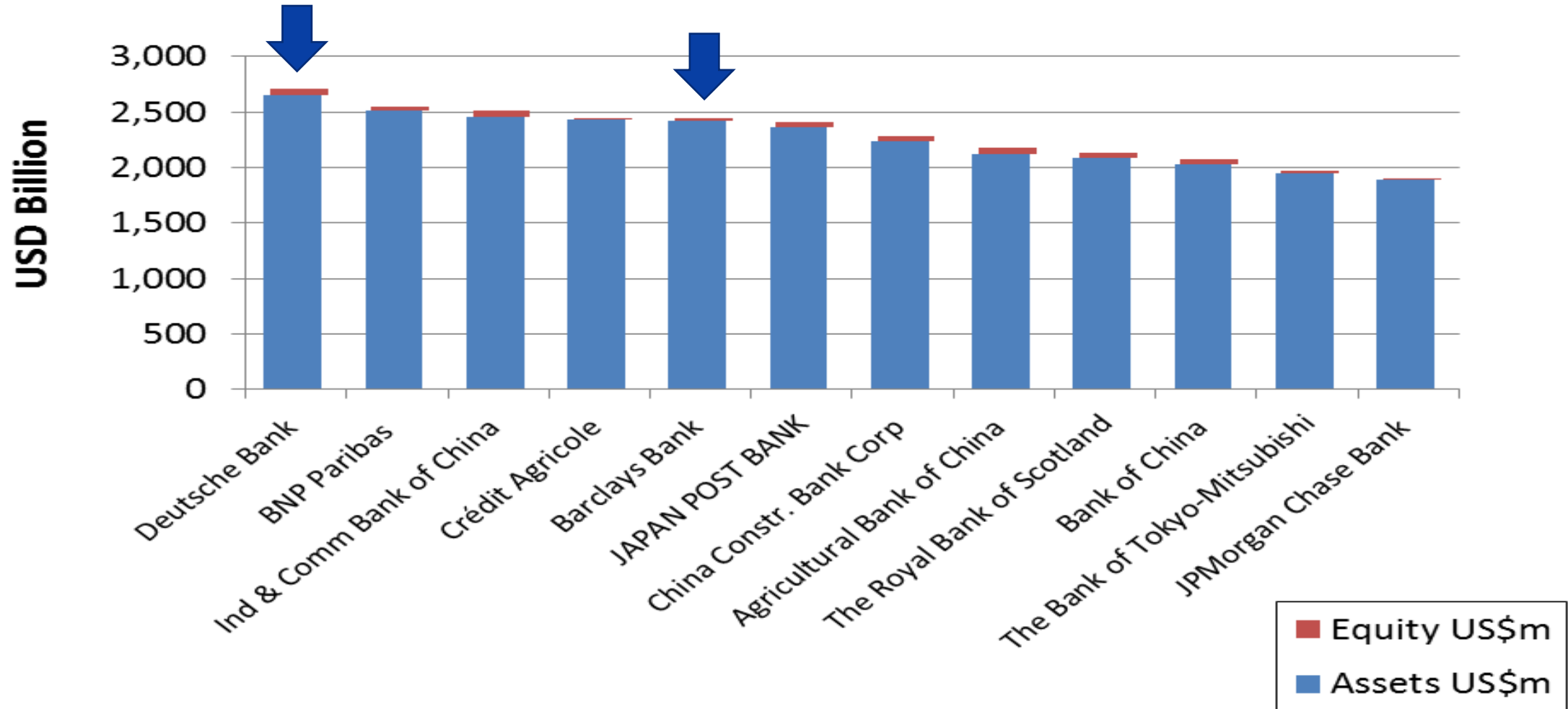
**Full version for professionals:**

<https://priceconomics.com/porsche-the-hedge-fund-that-also-made-cars/>

# Derivatives structure



## World's Largest Banks by Assets (Dec 12)



Deutsche Bank AG (DBK.DE) - XETRA Ticker: 514000/SIN: DE0005140008



**12.23** ↑0.24(2.04%) 14 Oct 16:35

Enter name or symbol | Get Chart | COMPARE | EVENTS | TECHNICAL INDICATORS | CHART SETTINGS | RESET

Oct 2016: ■ DBK.DE 12.24

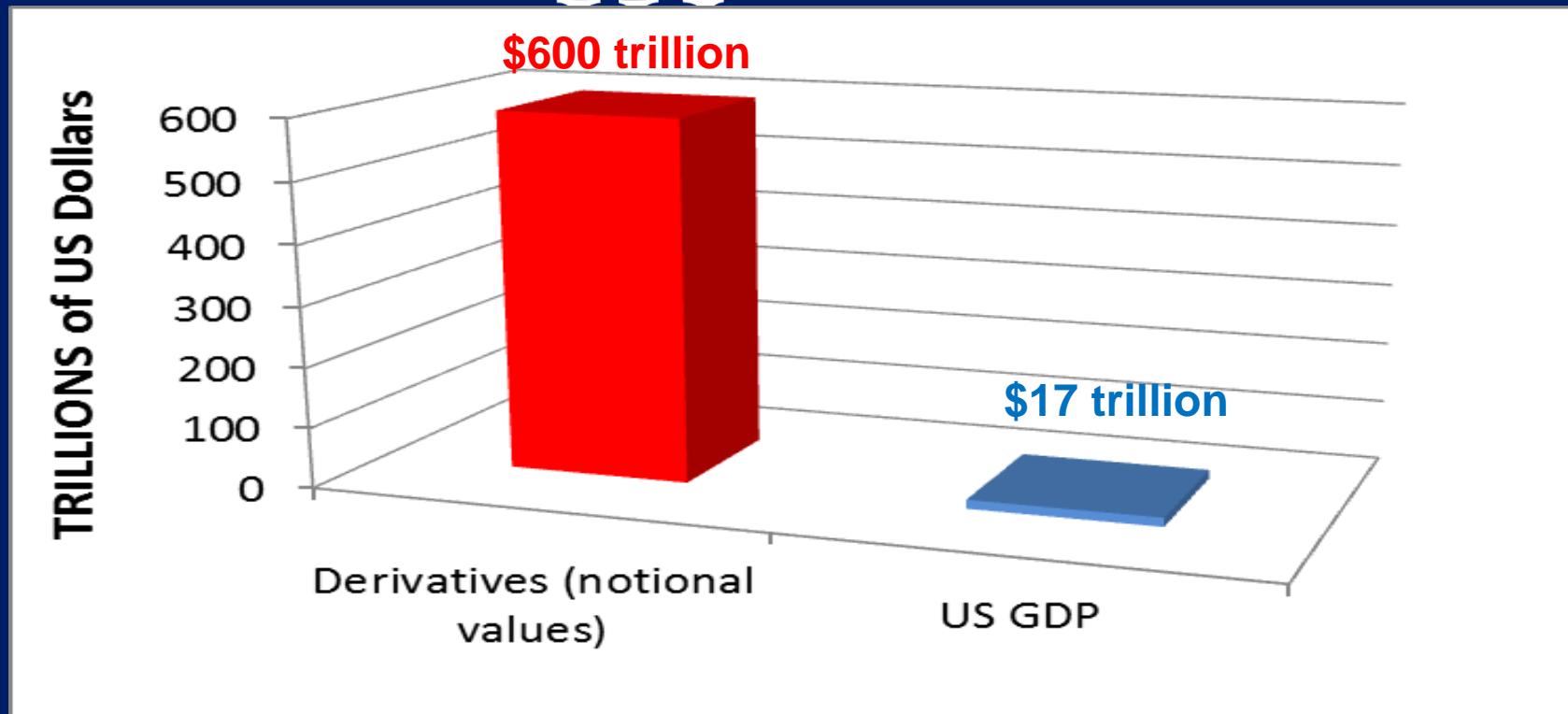
**“Deutsche Bank appears to be the most important net contributor to systemic risks in the global banking system.” (IMF, June 2016)**



European  
“Lehman  
Brothers”  
threat

□ *A derivative is a financial instrument whose return is derived from the return on another instrument.*

□ Size of the OTC derivatives market at year-end 2010



# Consolidated Balance Sheet

in € m.	Notes	Dec 31, 2012	Dec 31, 2011
<b>Assets:</b>			
Cash and due from banks		27,885	15,928
Interest-earning deposits with banks		119,548	162,000
Central bank funds sold and securities purchased under resale agreements	21, 22	36,570	25,773
Securities borrowed	21, 22	23,947	31,337
Financial assets at <a href="#">ABC</a> fair value through profit or loss			
Trading assets		245,538	240,924
Positive market values from <a href="#">ABC</a> derivative financial instruments		768,316	859,582
Financial assets designated at fair value through profit or loss		187,027	180,293
Total financial assets at fair value through profit or loss			
Financial liabilities at fair value through profit or loss	13, 15, 36		
Trading liabilities		54,914	1,280,799
Negative market values from derivative financial instruments		752,706	
Financial liabilities designated at fair value through profit or loss		109,166	45,281
Investment contract liabilities		7,732	
<a href="#">ABC</a> equity method investments	18	3,577	3,759
Loans			
of which € 2 billion and € 3 billion were pledged to creditors and can be sold or repledged each year ending December 31, 2012 and 2011, respectively	19, 20, 21, 22	397,279	412,514
Property and equipment	23	4,963	5,509
<a href="#">ABC</a> Goodwill and other intangible assets	25	14,219	15,802
Other assets	26, 27	123,973	154,794
Assets for current tax	35	2,390	1,870
<a href="#">ABC</a> Deferred tax assets	35	7,718	8,737
<b>Total assets</b>		<b>2,012,329</b>	<b>2,164,103</b>
<b>Liabilities and equity:</b>			
Deposits	28	577,202	601,730
Central bank funds purchased and securities sold under <a href="#">ABC</a> repurchase agreements	21, 22	36,144	35,311
Securities loaned	21, 22	3,109	8,089
Financial liabilities at fair value through profit or loss	13, 15, 36		

## Definition

A swap is an agreement between two parties to exchange sequences of cash flows for a set period of time. Usually, at the time the contract is initiated, at least one of these series of cash flows is determined by a random or uncertain variable, such as an interest rate, foreign exchange rate, equity price or commodity price. Conceptually, one may view a swap as either a portfolio of forward contracts, or as a long position in one bond coupled with a short position in another bond. This article will discuss the two most common and most basic types of swaps: the plain vanilla interest rate and currency swaps.

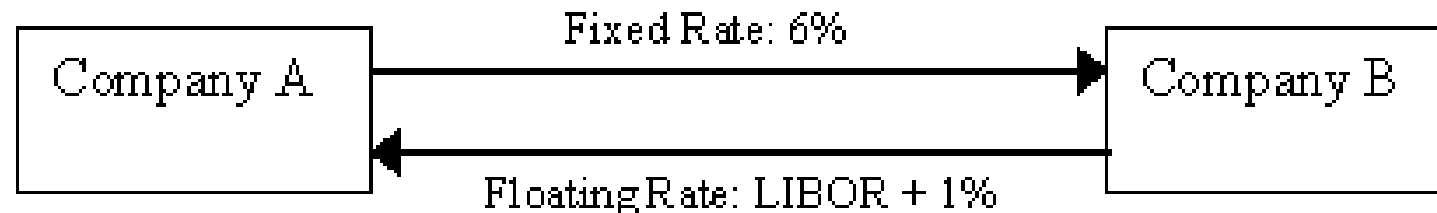
### **The Swaps Market**

Unlike most standardized options and futures contracts, swaps are not exchange-traded instruments. Instead, swaps are customized contracts that are traded in the over-the-counter (OTC) market between private parties. Firms and financial institutions dominate the swaps market, with few (if any) individuals ever participating. Because swaps occur on the OTC market, there is always the risk of a counterparty defaulting on the swap.

## Example

In Dec. 31, 2014, Company A and Company B enter into a five-year swap with the following terms: Company A pays Company B an amount equal to 6% per annum on a notional principal of \$20 million. Company B pays Company A an amount equal to one-year LIBOR + 1% per annum on a notional principal of \$20 million.

At the end of 2015, Company A will pay Company B  $\$20,000,000 * 6\% = \$1,200,000$ . On Dec. 31, 2014, one-year LIBOR was 5.33%; therefore, Company B will pay Company A  $\$20,000,000 * (5.33\% + 1\%) = \$1,266,000$ . In a plain vanilla interest rate swap, the floating rate is usually determined at the beginning of the settlement period. **Normally, swap contracts allow for payments to be netted against each other to avoid unnecessary payments THIS HELPS REDUCE COUNTERPARTY CREDIT RISK.** Here, Company B pays **\$66,000**, and Company A pays nothing. At no point does the principal change hands, which is why it is referred to as a "notional" amount.



## Definition

The contract offers the buyer the right, but not the obligation, to buy (call) or sell (put) a security or other financial asset at an agreed-upon price (the strike price) during a certain period of time or on a specific date (exercise date).

Call options give the option to buy at certain price, so the buyer would want the stock to go up.

Put options give the option to sell at a certain price, so the buyer would want the stock to go down.

Traders use options to speculate, which is a relatively risky practice, while hedgers use options to reduce the risk of holding an asset.

In terms of speculation, option buyers and writers have conflicting views regarding the outlook on the performance of an underlying security.

For example, because the option writer will need to provide the underlying shares in the event that the stock's market price will exceed the strike, an option writer that sells a call option believes that the underlying stock's price will drop relative to the option's strike price during the life of the option, as that is how he or she will reap maximum profit.

This is exactly the opposite outlook of the option buyer. The buyer believes that the underlying stock will rise, because if this happens, the buyer will be able to acquire the stock for a lower price and then sell it for a profit.

## Why are Options used?

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## Leverage: Why Options are used

Consider the following example. If you're going to invest \$10,000 in a \$50 stock, you might be tempted to think you would be better off investing that \$10,000 in \$10 options instead. After all, investing \$10,000 in a \$10 option would allow you to buy 10 contracts (one contract is worth one hundred shares of stock) and control 1,000 shares. Meanwhile, \$10,000 in a \$50 stock would only get you 200 shares

## Positions

Long call (buying a call)

Short call (writing or issuing a call)

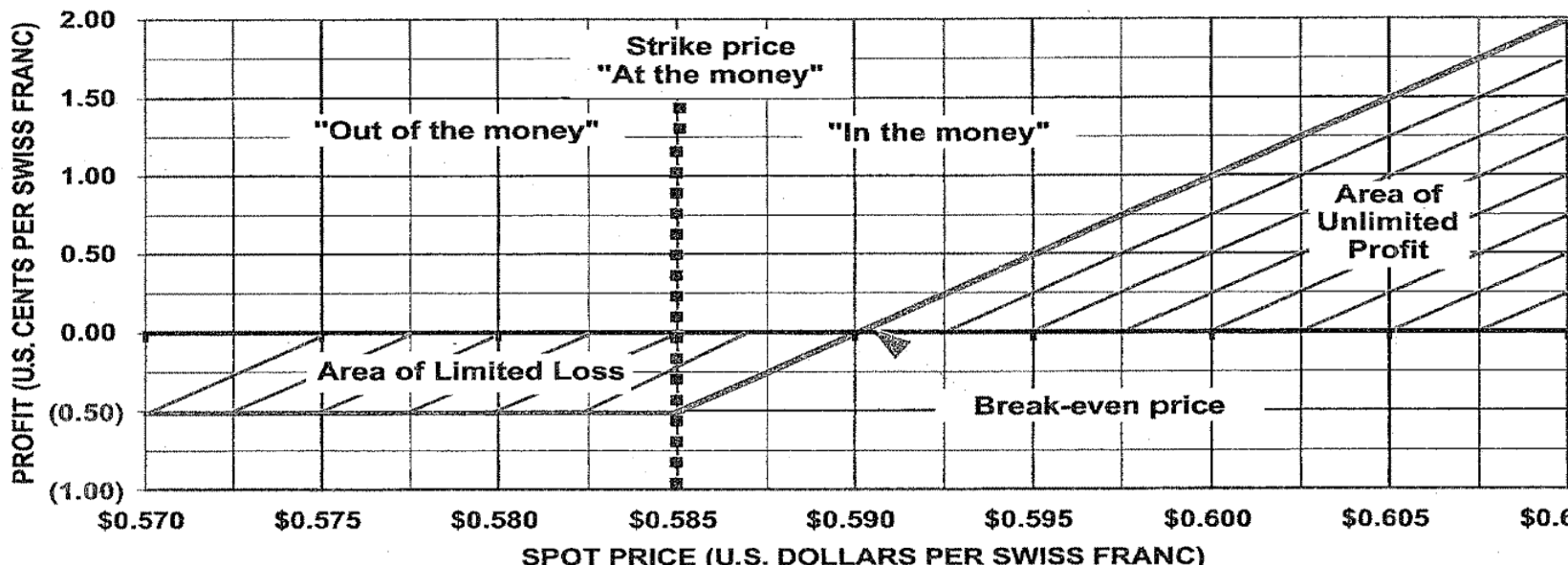
Long put (buying a put)

Short put (writing or issuing a put)

# Currency option example

EXHIBIT 8.4

## Buying a Call Option on Swiss Francs

	A	B	C	D	E	F	G						
1	<b>Exhibit 8.4: BUYING A CALL OPTION ON SWISS FRANCS</b>												
2	Cost of the Call Option	\$0.005											
3	Exercise Price	\$0.585											
4	Spot price of Swiss Franc (US\$)	\$0.570	\$0.580	\$0.585	\$0.590	\$0.600	\$0.610						
5	Buyer's Payoff for Call Option (U.S. cents/Swiss Franc)	(0.500)	(0.500)	(0.500)	0.000	1.000	2.000						
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
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20													
21													
22													
23													
24													
25													
26													
27	Key Cell Entries												
28	B5: =IF(B4>\$B\$3,B4-\$B\$3-\$B\$2,-\$B\$2)*100, copy to C5:G5												

## Definition

A customized contract between two parties to buy or sell an asset at a specified price on a future date. A forward contract can be used for hedging or speculation, although its non-standardized nature makes it particularly apt for hedging. Unlike standard futures contracts, a forward contract can be customized to any commodity, amount and delivery date.

A forward contract settlement can occur on a cash or delivery basis. Forward contracts do not trade on a centralized exchange and are therefore regarded as over-the-counter (OTC) instruments. While their OTC nature makes it easier to customize terms, the lack of a centralized clearinghouse also gives rise to a higher degree of default risk. As a result, forward contracts are not as easily available to the retail investor as futures contracts.

- OTC
- One settlement at the end of the contract
- Not subject to asset price volatility in the interim
- Delivery may happen upon expiry
- Preferred by hedgers
- Less accessible to traders

## Example

1. Today buy SF173,611.11 forward six months at the forward quote of \$0.5760/SF. Note that this step requires no outlay of cash.
2. In six months fulfill the forward contract, receiving SF173,611.11 at \$0.5760/SF for a cost of \$100,000.
3. Simultaneously sell the SF173,611.11 in the spot market, at Hans' expected future spot rate of \$0.6000/SF, receiving  $\text{SF}173,611.11 \times \$0.6000/\text{SF} = \$104,166.67$ .

This is a profit of \$4,166.67 ( $\$104,166.67 - \$100,000.00$ ).

The profit of \$4,166.67 cannot be related to an investment base to calculate a return on investment because the dollar funds were never needed. On the six-month anniversary Hans simply crosses the payment obligation of \$100,000 with receipts of \$104,166.67, and accepts a net \$4,166.67. Nevertheless, some financial institutions might require him to deposit collateral as margin to ensure his ability to complete the trade.

## Definition

A contractual agreement, generally made on the trading floor of a futures exchange, to buy or sell a particular commodity or financial instrument at a pre-determined price in the future. Futures contracts detail the quality and quantity of the underlying asset; they are standardized to facilitate trading on a futures exchange. Some futures contracts may call for physical delivery of the asset, while others are settled in cash.

- Daily settlement
- Usually no delivery happens upon expiry
- Exchange-traded
- Subject to volatility risk
- Used frequently by speculators
- More widely accessible to traders

- A derivative contract
- Has expiry date
- Gives right but not obligation to buy an asset

**Option**

- Most common derivative involves exchanging cashflows
- Typically, one party pays at fixed rate while the other pays at varying rate

**Swap**

- Contract to buy an asset at an agreed price, at a later date
- Does not involve physical exchange of goods and is subject to daily settlement of gains and losses

**Futures  
contract**

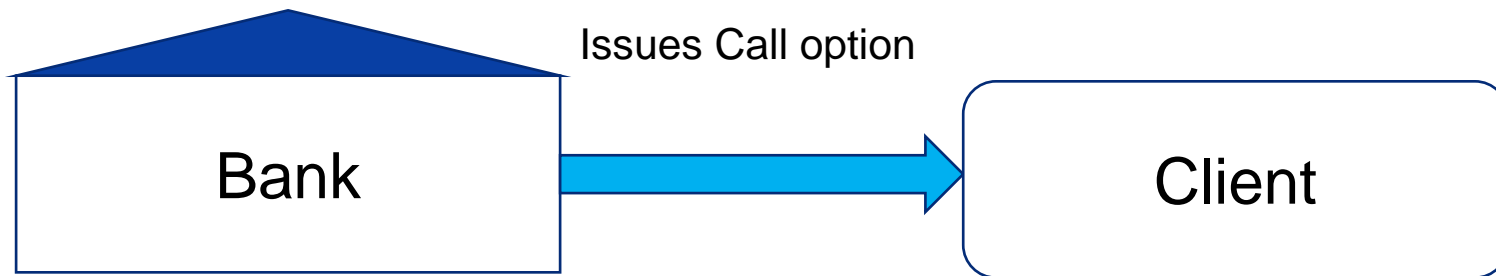
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**Forward  
contract**

# Client Hedging using an option

## Key Information:

- Gold is trading at \$1,300 dollars per ounce on the commodity exchange
- Gold mining company ABC predicts it will rise to \$1,500 in 12 months' time
- ABC company is the client of Deutsche bank
- DB have the mandate to write (issue) options for their clients
- DB charges 8% (of the current price) premium in exchange for issuing the Call option at strike price equal to the current, with 12 months to expiry



- Call option, strike 1,300, 12 months to expiry
- Client can exercise anytime BUT will only if the price goes higher than 1,300 – to make a profit

## Scenario A

Price goes up, above 1,300  
Client exercises the option and makes profit less the DB premium fee

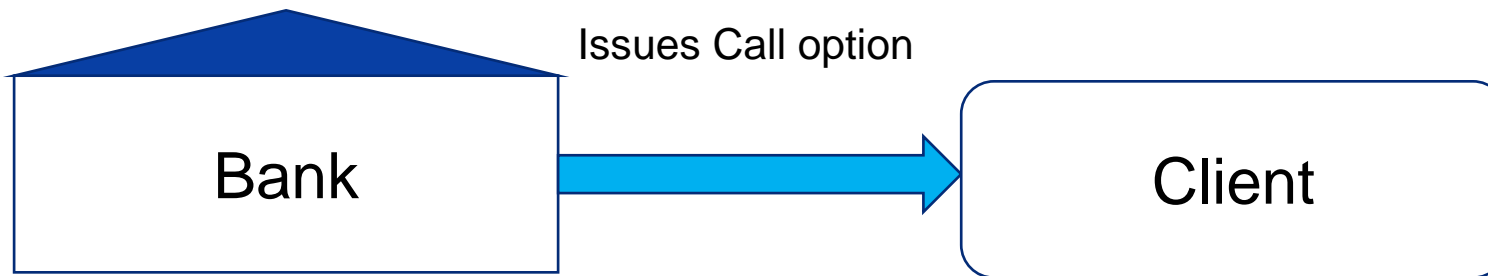
## Scenario B

Price goes down below 1,300 or stays about the same  
Client let's the option expire and loses the amount it paid to DB

# Dealer Hedging using an option

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- Gold mining company ABC predicts it will rise to \$1,500 in 12 months' time
- ABC company is the client of Deutsche bank
- DB have the mandate to write (issue) options for their clients
- DB charges 8% (of the current price) premium in exchange for issuing the Call option at strike price equal to the current, with 12 months to expiry



- Call option, strike 1,300, 10,000 ounces, 12 months to expiry
- Client will only if the price goes higher than 1,300 – to make a profit

## DB hedging A

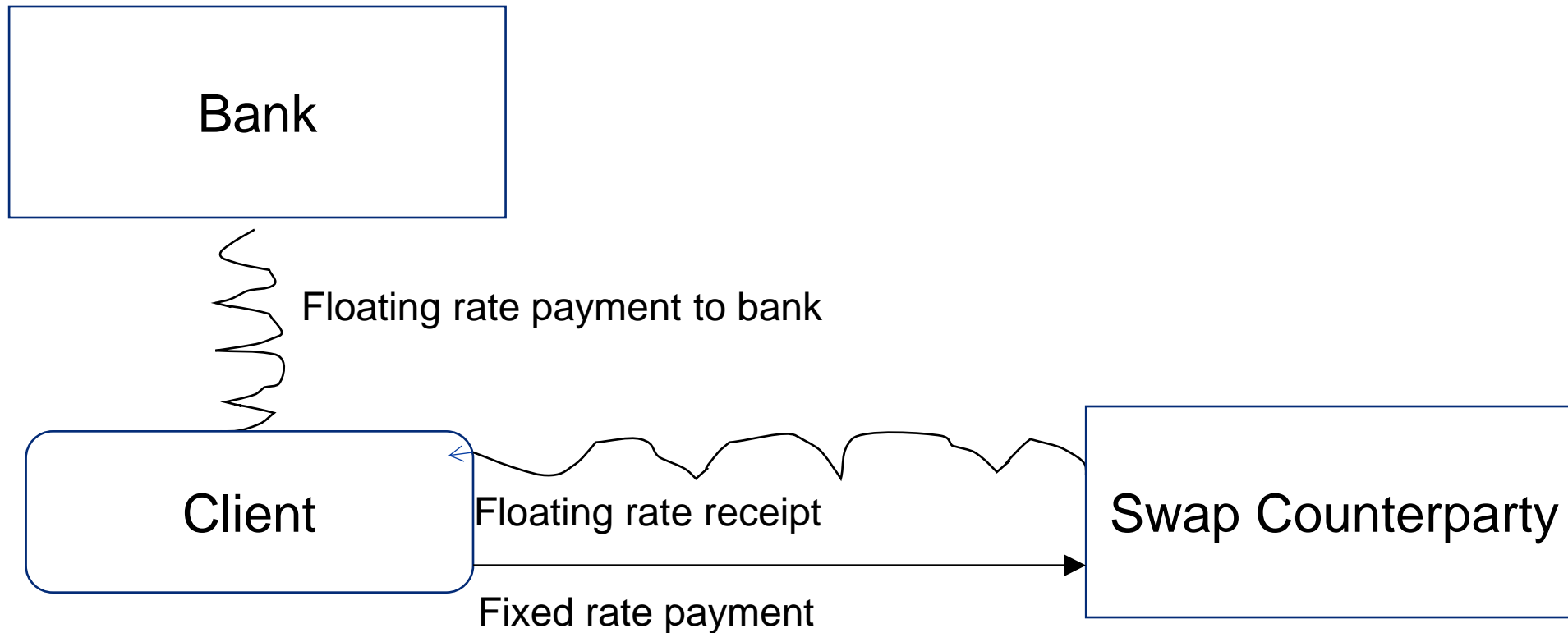
DB takes 8% fee earned and buys a Call option at the same strike price and same duration – to protect itself in case the gold goes above 1,300 and it has to pay the client the increase in price. DB pays less for an option that does the client. That difference is DB's profit (margin).

## DB hedging B

DB takes the 8% earned and buys a Gold certificate from an Exchange Traded Fund that gives ownership right to equivalent of 10,000 ounces of gold then buys a Put option on gold. If price goes above 1,300 and client exercises the option, then DB will sell the gold certificate to pay the client the profit they earned. If the price goes lower, DB will exercise the Put option and offset the losses incurred from the gold price decline.

# Using a swap

In a plain vanilla interest rate swap, Company A and Company B choose a time frame, a principal amount, a single currency, a fixed interest rate, a floating interest rate and payment dates. On the specified payment dates for the duration of the time frame, Company A pays Company B a fixed rate of interest on the principal amount, and Company B pays Company A a floating interest rate on the principal amount. All payments are made in the same currency and only the net sum of each payment exchanges hands. The purpose of such an exchange might be to reduce interest-rate risk.



Stock price is \$125.94

**TABLE 3.2** Intrinsic Values and Time Values of DCRB Calls

Exercise Price	Intrinsic Value	Time Value		
		May	June	July
120	5.94	2.81	9.46	14.96
125	0.94	4.81	12.56	17.66
130	0.00	3.60	11.35	16.40

**TABLE 9.1** Valuing a Forward Contract Prior to Expiration

Portfolio	Composition	Value at 0	Value at t	Value at T
A	Long forward contract established at t at price of $F(0,T)$	0	$V_t(0,T)$	$S_T - F(0,T)$
B	Long position in asset and loan of $F(0,T)(1+r)^{-(T-t)}$ established at t	N/A	$S_t - F(0,T)(1+r)^{-(T-t)}$	$S_T - F(0,T)$

Conclusion: The value of portfolio A at t must equal the value of portfolio B at t.

$$V_t(0,T) = S_t - F(0,T)(1+r)^{-(T-t)}$$

## **Recommended reading for Introduction to Derivatives:**

Fabozzi, Bond Markets, Analysis and Strategies, Chapters 21, 22 and 23  
(Interest rate futures, Interest rate options and Interest rate swaps)

Fabozzi, Fixed Income Analysis, Chapters 13 and 14 (Interest rate derivatives  
and Valuation of interest rate derivatives)

Choudhry (Introduction to Bond Markets): Chapter 11, Introduction to derivative  
instruments

Chance & Brooks, Introduction to Derivatives and Risk Management, Chapters  
2, 3, 8, 9, 12, 13