Bachelor of Economics
THAMMASAT UNIVERSITY

FN 211 Financial Markets

Class 4: Money Markets

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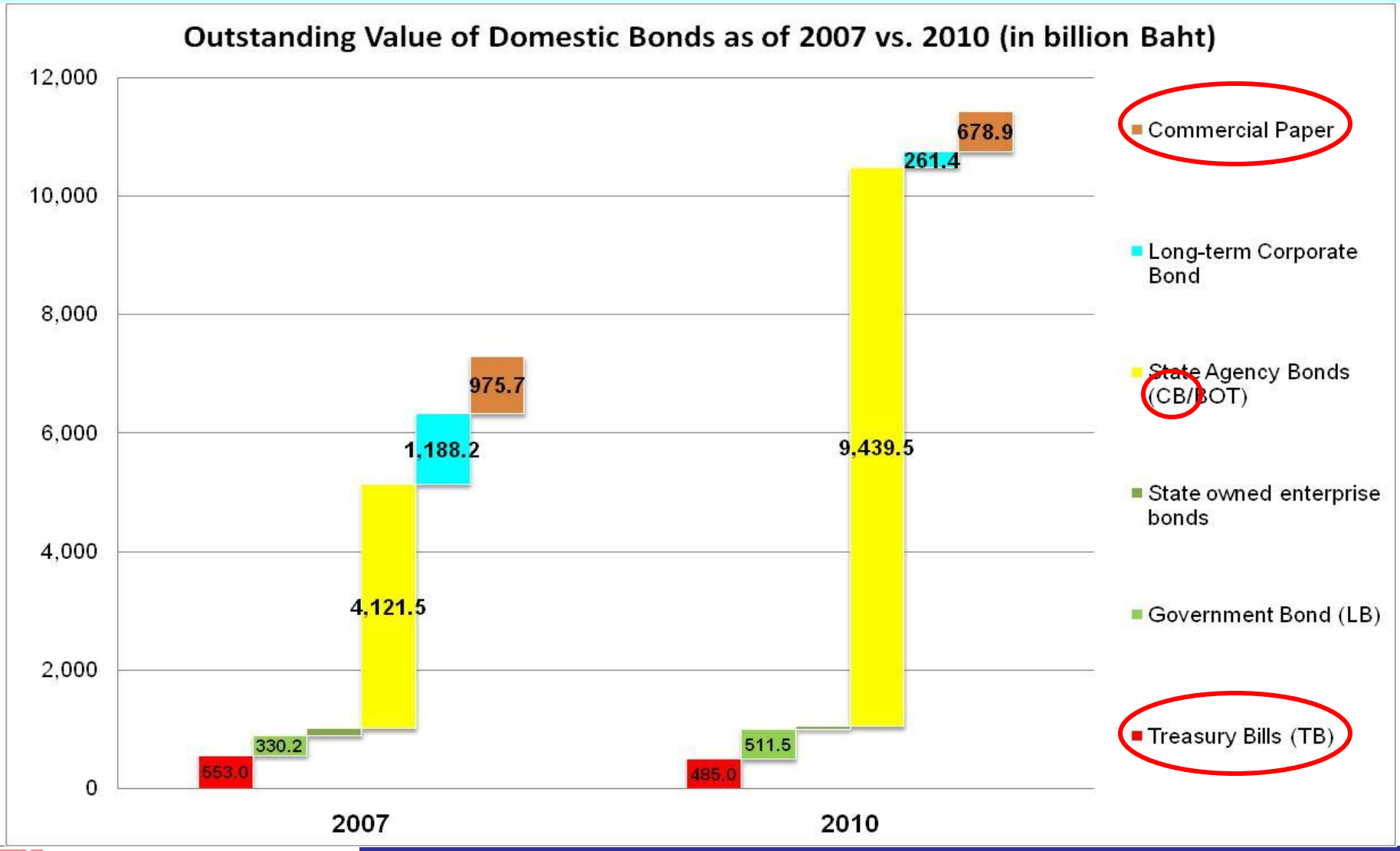
Overview of Thai Bond Markets



Today's Outline

The Thai Money Markets

1. Characteristics and Participants
2. Instruments
   - Government Type
   - Corporate Type
   - Interbank Loan
   - Repurchase Agreement

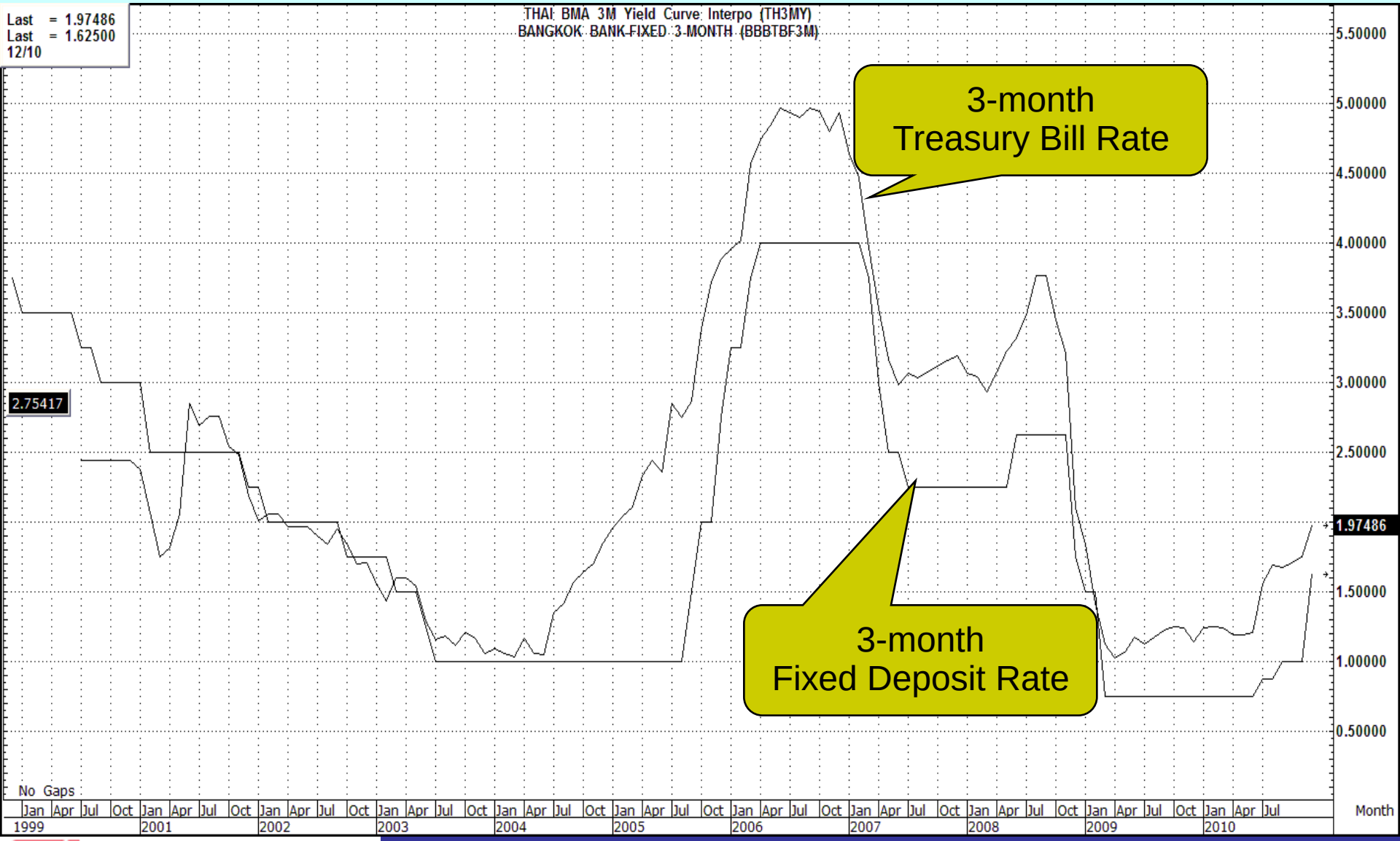
The Global Money Markets

- Federal Funds in the US
- Eurodollars

Characteristics of the Money Markets

- *Money market* is the market for short-term (one year or less) borrowing.
- The money market is the mechanism through which holders of temporary cash surpluses meet holders of temporary cash deficits.
- Money Markets exist because
  - Short-term investors get returns *higher* than those of bank deposits.
  - Short-term borrowers get borrowing rates *lower* than those of bank loans.

Characteristics of the Money Markets



Characteristics of the Money Markets

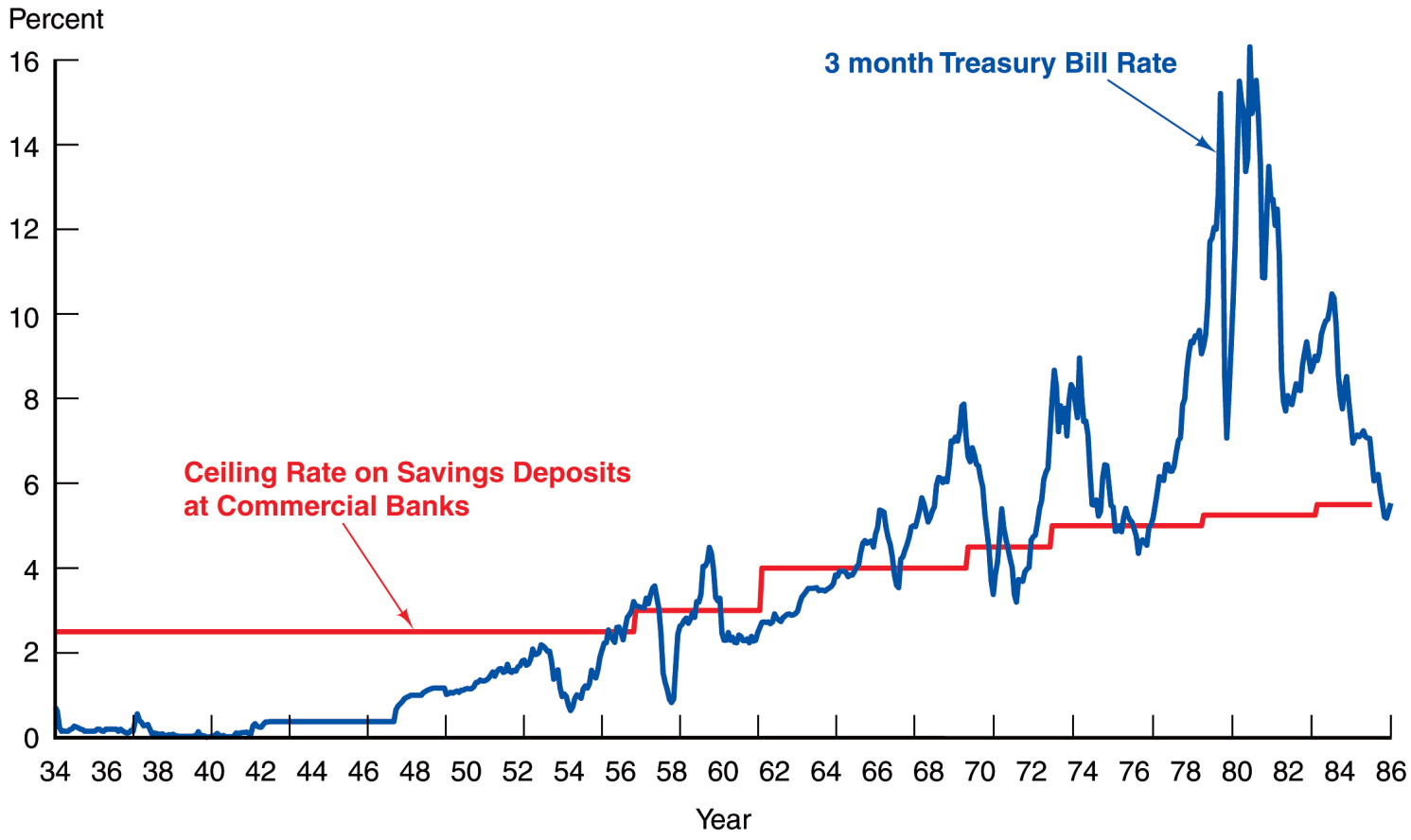


Figure 9.1 3-Month Treasury Bill Rate and Ceiling Rate on Savings Deposits at Commercial Banks

Source: http://www.stlouisfed.org/default.cfm.

Characteristics of the Money Markets

	Money Markets Instruments	Government Bonds	Corporate Bonds
Maturity	≤ 1 year	> 1 year	
Denomination	Large	Large	Large, except for public offering
Default Risk	Very Low	Very Low	Low – High *(depend on rating)*
Interest Rate Risk *or* Price Risk	Low	Medium – High *(depend on duration)*	
Coupon	Zero coupon, usually sold at discount	Mostly Semi-annually	

Participants in the Money Markets

Participant	Lender/ Borrower	Role
Ministry of Finance	Borrower	Issue Treasury Bills (TB) to borrow money
Bank of Thailand	Both	• Act as an agent of the MOF to distribute TBs using e-auction • Issue Central Bank Bills (CB) which are used primarily to conduct Monetary Policy. • Buy and Sell ST instruments to conduct Monetary Policy
Commercial Banks	Both	• Issue NCD and Commercial Papers (B/E, P/N, ST Debentures) to borrow money • Buy and Sell ST instruments to manage liquidity • Borrow and Lend in the Interbank Market • Borrow and Lend in the Repurchase Market
Finance Companies	Both	• Issue P/N to borrow money • Buy and Sell ST instruments to manage liquidity

Participants in the Money Markets

Participant	Lender/ Borrower	Role
Businesses	Both	• Issue Commercial Papers to borrow money • Invest in ST instruments to warehouse surplus funds • Borrow and Lend in the Repurchase Market
Pension Funds/Insurance Companies	Lenders	• Invest in ST instruments mainly for liquidity purpose • Borrow and Lend in the Repurchase Market
Asset Management Companies	Lenders	• Invest in ST instruments mainly for Money Market Funds
Individuals	Lenders	• Invest through Money Market Funds

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Instruments: Government Type

1. **Treasury Bills (TB)** , issued by the *Ministry of Finance*, are treasury securities sold in the primary market by auction at a discount from face value. Upon maturity the face value will be paid to the holder. TBs typically have *28-day, 91-day, and 182-day* maturity period
2. **Central Bank Bills (CB)** , issued by the *Bank of Thailand*, are treasury securities sold in the primary market by auction at a discount from face value. Upon maturity the face value will be paid to the holder. CBs typically have *3 to 364 days* maturity period. They are used primarily for conducting monetary policy, managing liquidity and interest rate in financial market in order to stabilize economic growth.

Instruments: Government Type

Example of Treasury Bills

- Code : TB11629A
- Issuer : Ministry of Finance
- Initial Par : THB 1,000
- Issue Size : THB 1,000 million
- Issue Date : 29 December 2010
- Maturity Date : 29 June 2011
- Issue Term : 182 Days
- Yield: 2.05 – 2.14%

Example of Central Bank Bills

- Code : CB11901A
- Issuer : Bank of Thailand
- Initial Par : THB 1,000
- Issue Size : THB 12,000 million
- Auction Date : 3 March 2011
- Maturity Date : 1 September 2011
- Issue Term : 182 Days
- Yield: 2.53 – 2.60%

Cracking the Codes!

TB	11	6	29	A
(1)	*(2)*	*(3)*	*(4)*	*(5)*

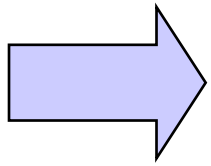
1) Type of instrument (in case of government securities) or name of issuer (in case of corporate securities)
   - *TB = Treasury Bill, CB = Central Bank Bill, etc.*
2) Year of Maturity
   - *11 = 2011*
3) Month of Maturity
   - *6 = June*
4) Date of Maturity (used only for Money Market instruments)
5) Series of instrument (A, B, C, ..), used to indicate in case of more than one instruments have the same maturity

Treasury Bill

- Every Monday, T-bills are auctioned by the Bank of Thailand. (*www.bot.or.th*)
- The auction process is called competitive bidding in which bidder who offers the lowest yield will have the first priority to be allocated the bills and the rest of the bills will be allocated consecutively to next bidders who offer a higher yield.

Treasury Bill: Auction Schedule

Auction Date	ThaiBMA Symbol	Issue Size (Mil. Baht)	Term	Payment Date	Maturity Date
27 Dec 2010	TB11126C	1,000	28 Days	29 Dec 2010	26 Jan 2011
27 Dec 2010	TB11330B	1,000	91 Days	29 Dec 2010	30 Mar 2011
27 Dec 2010	TB11629A	1,000	182 Days	29 Dec 2010	29 Jun 2011
20 Dec 2010	TB11119C	1,000	28 Days	22 Dec 2010	19 Jan 2011
20 Dec 2010	TB11323B	1,000	91 Days	22 Dec 2010	23 Mar 2011
20 Dec 2010	TB11622A	1,000	182 Days	22 Dec 2010	22 Jun 2011
13 Dec 2010	TB11112C	1,000	28 Days	15 Dec 2010	12 Jan 2011
13 Dec 2010	TB11316B	1,000	91 Days	15 Dec 2010	16 Mar 2011
13 Dec 2010	TB11615A	1,000	182 Days	15 Dec 2010	15 Jun 2011
03 Dec 2010	TB11105C	1,000	28 Days	08 Dec 2010	05 Jan 2011
03 Dec 2010	TB11309B	1,000	91 Days	08 Dec 2010	09 Mar 2011
03 Dec 2010	TB11608A	1,000	182 Days	08 Dec 2010	08 Jun 2011
29 Nov 2010	TB10D29C	1,000	28 Days	01 Dec 2010	29 Dec 2010
29 Nov 2010	TB11302B	1,000	91 Days	01 Dec 2010	02 Mar 2011
29 Nov 2010	TB11601A	1,000	182 Days	01 Dec 2010	01 Jun 2011
22 Nov 2010	TB10D22C	1,000	28 Days	24 Nov 2010	22 Dec 2010
22 Nov 2010	TB11223B	1,000	91 Days	24 Nov 2010	23 Feb 2011
22 Nov 2010	TB11525A	1,000	182 Days	24 Nov 2010	25 May 2011



Treasury Bill: Auction Result

Debt Securities Auction Results

Auction Date : 27 December 2010

The Ministry of Finance has approved the auction result as follow(s)

ThaiBMA Symbol	TB11126C	TB11330B	TB11629A
Payment Date	29/12/10	29/12/10	29/12/10
Maturity Date	26/1/11	30/3/11	29/6/11
Coupon Rate (percent per annum)	-	-	-
Auction Amount (million baht)	1,000.00	1,000.00	1,000.00
Amount of accepted CB (million baht)	1,000.00	1,000.00	1,000.00
Accepted Yield (%)	1.8400 - 1.8500	1.8700 - 1.8800	2.0500 - 2.1400
Weighted Average Accepted Yield (%)	1.84500	1.87662	2.11070
Bid Coverage Ratio	8.10	5.39	2.89
Amount of accepted NCB (million baht)	-	-	-

Treasury Bill: Price Calculation

Suppose today is 27 December 2010 and you bid for TB11629A, the 6-month treasury bill which matures on 29 June 2011, at the auction and you were allocated the bill at the yield of 2.14%. The payment date is 29 December 2010. Calculate the price per unit to be paid on the settlement date, given that face value is 1,000 Baht.

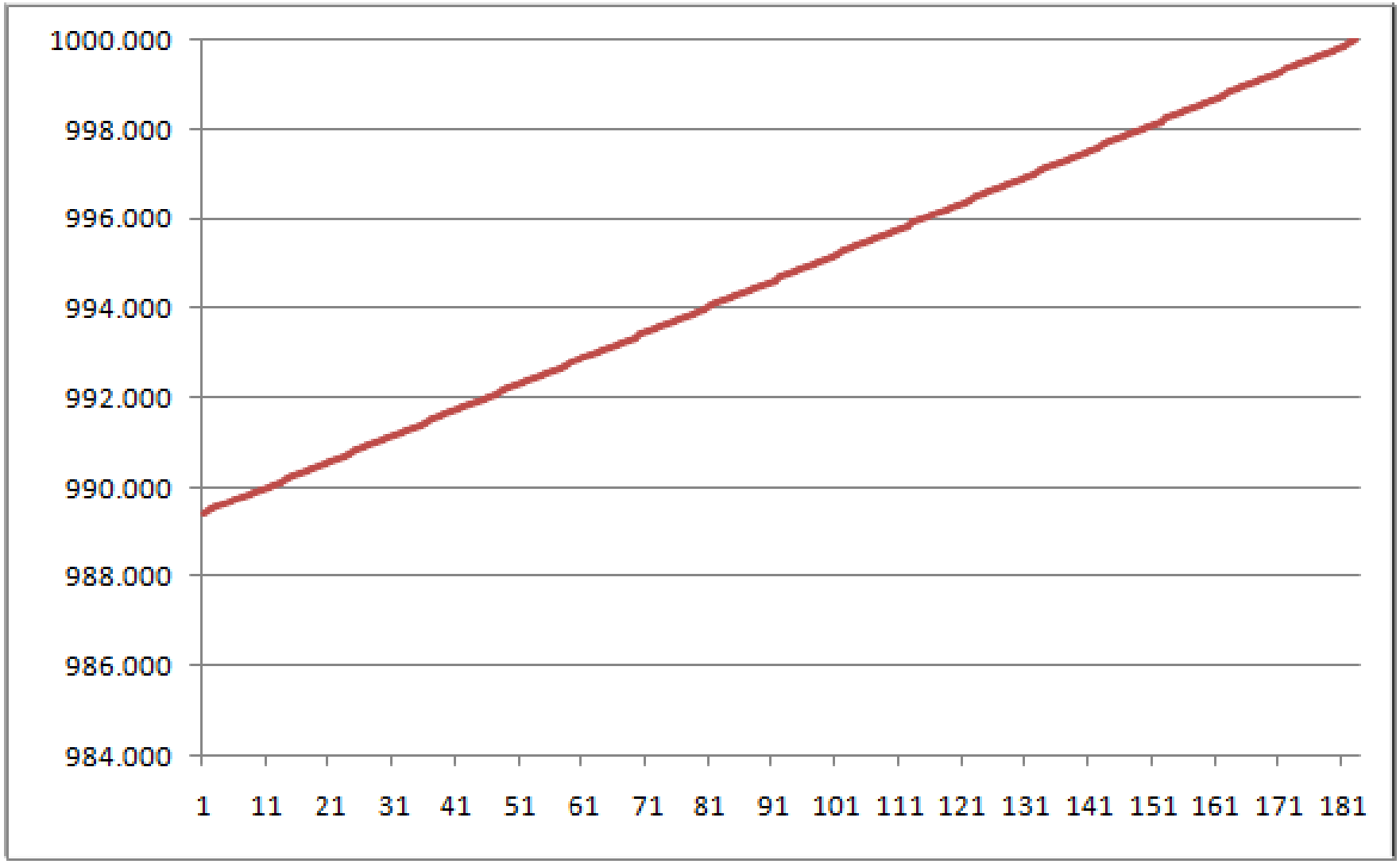
$$\text{Price} = \frac{\text{Face Value}}{\left(1+\left(\frac{r}{100} x \frac{d}{365}\right)\right)}$$

$$= \frac{1{,}000}{\left(1+\left(\frac{2.14}{100} x \frac{182}{365}\right)\right)}$$

$$= \frac{1{,}000}{1.01067}$$

$$= 989.442$$

Treasury Bill: Price Calculation



Instruments: Corporate Type

3. **Commercial Papers** are unsecured, short-term debt instruments with fixed maturity of *1 to 270 days*.
   - They are issued (sold) by large banks and corporations to get money to meet short term debt obligations (for example, payroll), and are only backed by issuing bank or corporation's promise to pay the face amount on the maturity date specified on the note.
   - Since it is not backed by collateral, *only firms with excellent credit ratings* from a recognized rating agency will be able to sell their commercial paper at a reasonable price.
   - Commercial paper is usually sold at a discount from face value, and carries shorter repayment dates than bonds.
   - Two methods of distribution
     - Public Offering – to the general public
     - Private Placement – to a small number of institutional investors
   - Examples are *Promissory Note (P/N), Bill of Exchange (B/E) and Short Term Debenture*

Instruments: Corporate Type

Example of Commercial Papers

- Code : CK11711A
- Issuer : Ch.Karnchang Plc.
- Issuer Rating : BBB by TRIS
- Initial Par : THB 1,000
- Issue Size : THB 1,000 million
- Issue Date : 14 October 2010
- Maturity Date : 11 July 2011
- Issue Term : 0.7 Yrs.
- Yield : 3.60%
- Distribution : Public Offering

Instruments: Corporate Type

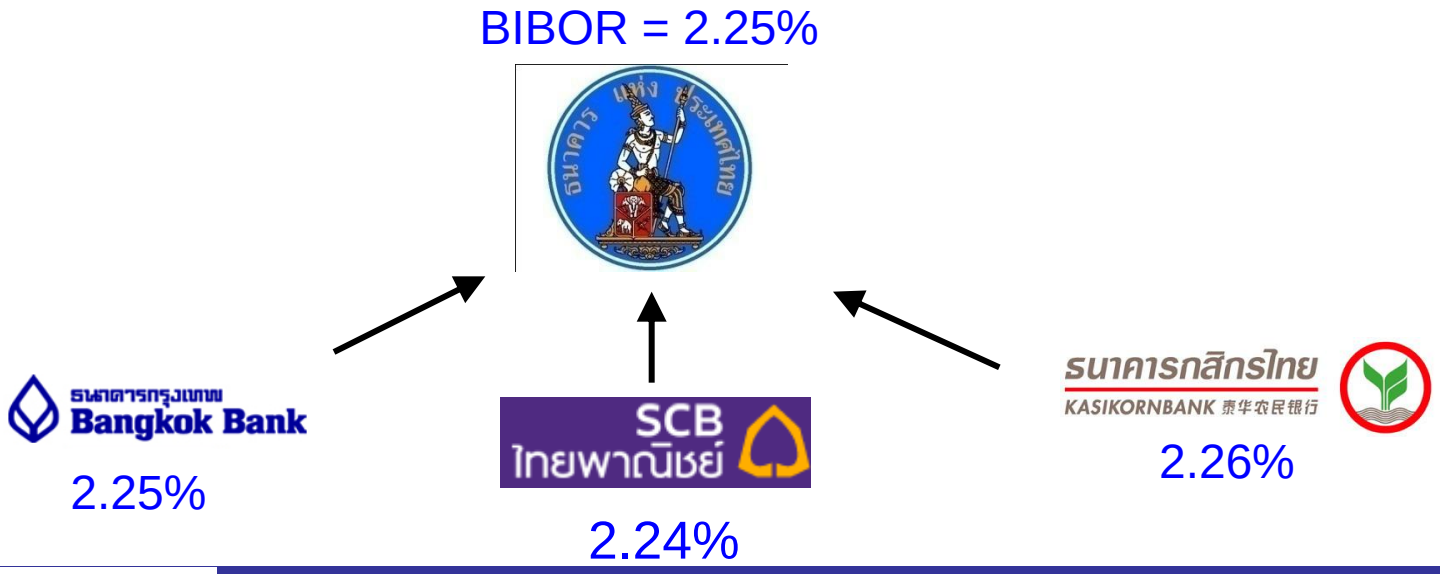
4. **Negotiable Certificate of Deposit (NCD)** is a bank-issued security that documents a deposit and specifies the interest rate and the maturity date.
   - Because a maturity date is specified, NCD is a *Term Security*, as opposed to Savings Deposit which can be withdrawn at any time.
   - NCD is also called a *Bearer Instrument*, which means that whoever holds the instrument at maturity receives the principal and interest.
   - NCD is *Negotiable*, so it can be bought and sold until maturity.
   - NCD is usually sold in large denomination.

Instruments: Interbank Loan

5. **Interbank Loan** is short-term loan (usually for a period of *one day* or *overnight*) between commercial banks.
   - The Bank of Thailand (BOT) has set *minimum reserve requirements* that all banks must maintain.
   - To meet these reserve requirements, banks must keep a certain percentage of their total deposits with the BOT.
   - The main purpose is to provide banks with an immediate infusion of reserves should they be short.
   - In theory, banks can borrow directly from the BOT.
   - In practice, the BOT encourages banks to borrow from each other.

Instruments: Interbank Loan (Cont.)

- Since excess reserves earn no interests, banks with excess reserves are willing to lend to those with deficit.
  - *In 2009, the average volume was 28,400 million baht/day!*
- Participating banks will quote there own interbank rates.
- The BOT then calculates the average quoted rates among banks everyday and publish a set of fixed rates called *BIBOR* (Bangkok Interbank Offered Rate) to be used by all banks as reference.



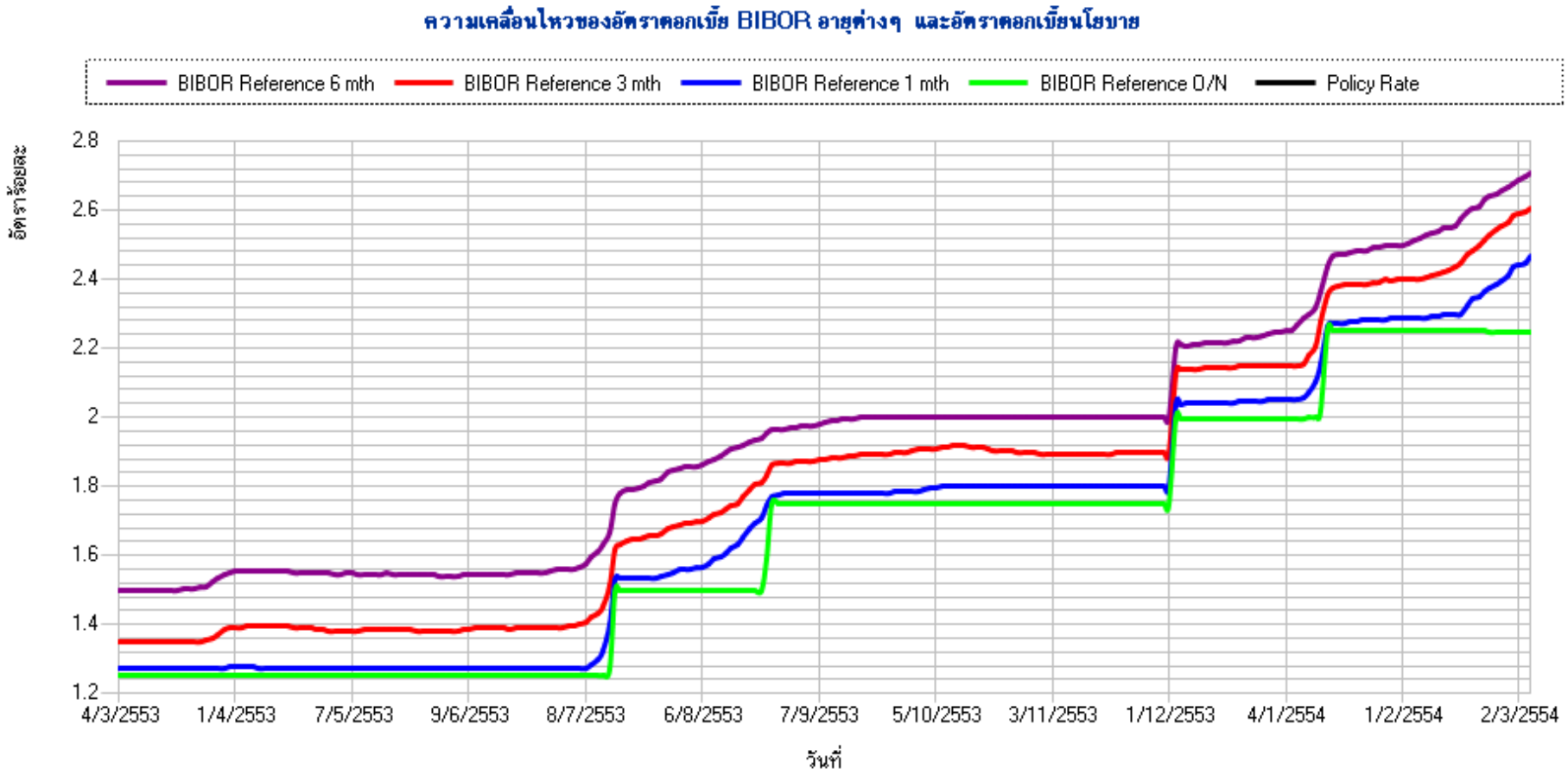
Instruments: Interbank Loan (Cont.)

Summary of BIBOR Design and Methodology	
Subject	**Description**
1.Current number of rate contributors	14 banks
2.Quote time	10.45-11.00 AM (Bangkok time)
3.Tenors	O/N,1 week, 1, 2, 3, 6, 9, and 12-month
4. Distribution time	11.15 AM onwards (the rates are specified as of 11.00 AM)
5.Settlement date	T+2 for all maturities except O/N
6.Day count convention	Actual/365
7.Calculation method	Eliminate the top and bottom quartiles of the quoted rates and arithmetically average the remaining rates
8.Calculation result	BIBOR rates with 5 decimals (rounding up the sixth decimal place when it is 5 or more)

Instruments: Interbank Loan (Cont.)

Tenor	Last (4/3/11)	Change	Previous (3/3/11)
O/N	2.2475	0.0000	2.2475
1 Week	2.3375	0.0563	2.2813
1 Month	2.4650	0.0163	2.4488
2 Month	2.5325	0.0088	2.5238
3 Month	2.6075	0.0113	2.5963
6 Month	2.7100	0.0113	2.6988
9 Month	2.7638	0.0100	2.7538
1 Year	2.8475	0.0100	2.8375

Instruments: Interbank Loan (Cont.)

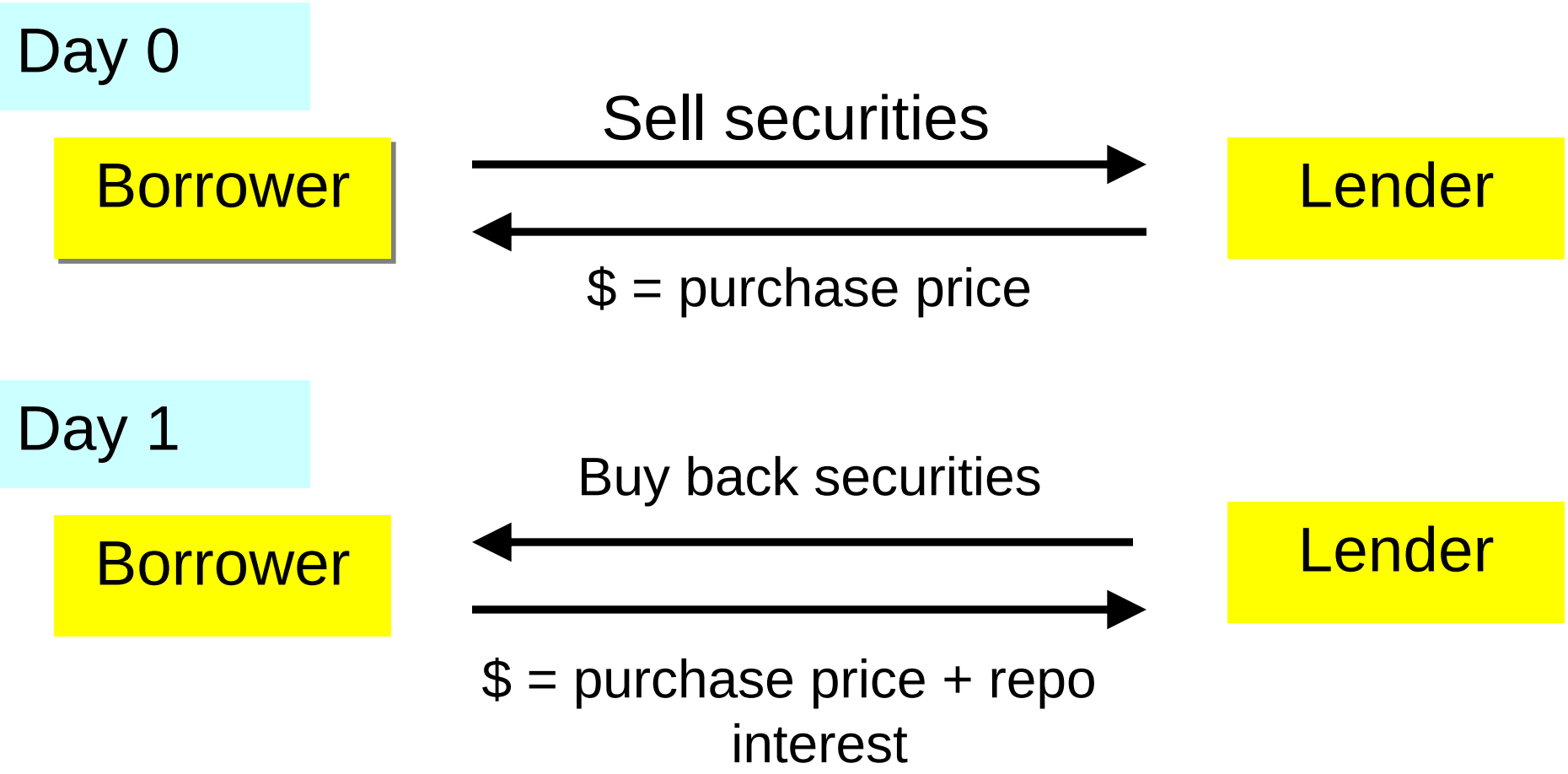


Instruments: Repurchase Agreement

6. **Repurchase Agreement (Repo)** is an agreement in which securities are exchanged for cash with an agreement to repurchase the securities at a future date. The maturity of RP transactions range from *overnight to one-year*.
   - Repo is simply a short-term loan, *collateralized* by (mostly) short-term government securities.
   - Repo allows one party (the lender) to temporarily exchange cash for securities and the other (the borrower) to temporarily exchange securities for cash.
   - This legal transfer of ownership for the duration of the contract provides protection against credit risk. Repos become low-risk investments and have lower interest rates than interbank loan.
   - Similar to the interbank market, banks use repo market to park their excess liquidity.

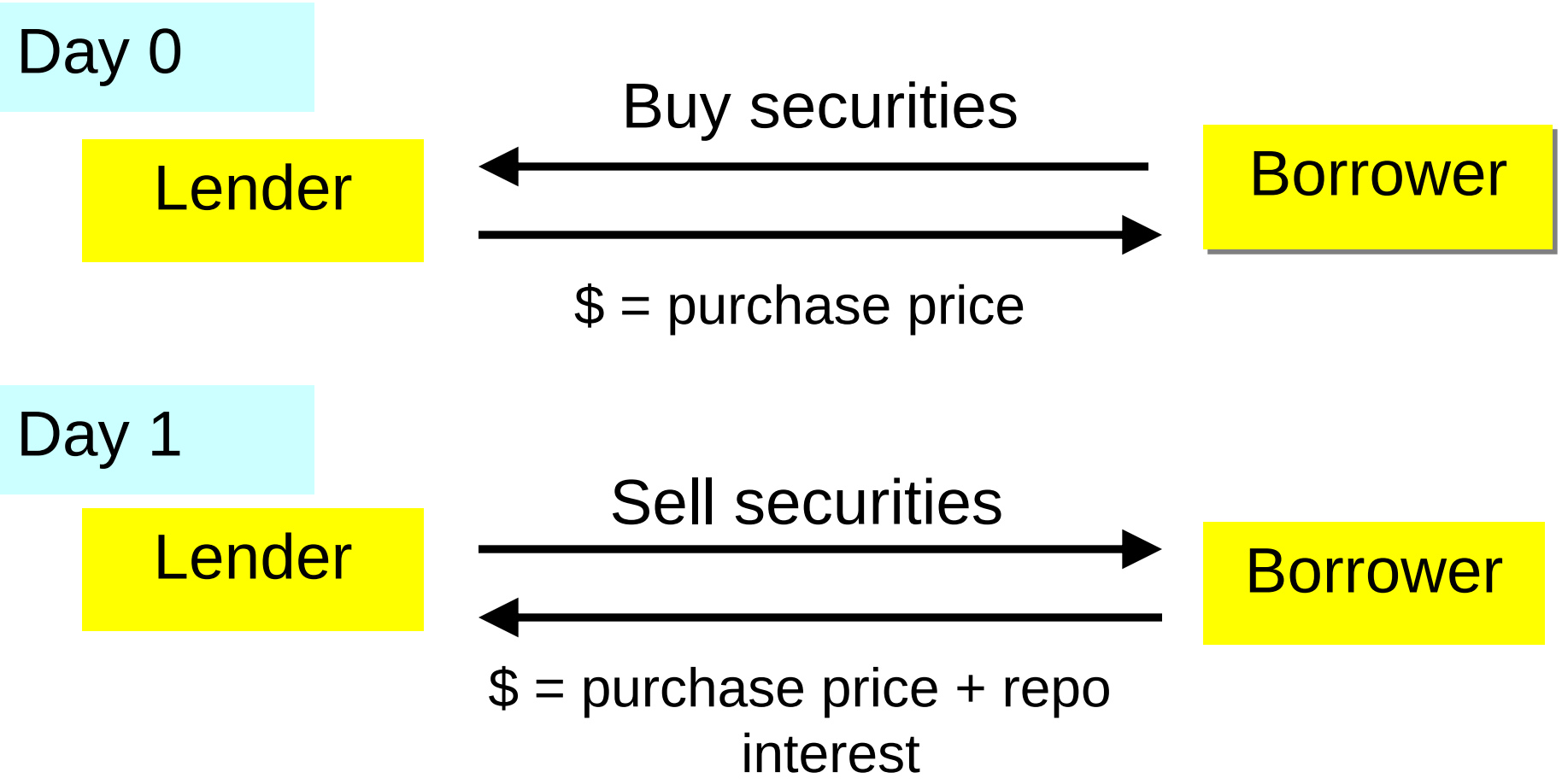
Instruments: Repurchase Agreement

Example of 1-day Repurchase Contract



Instruments: Repurchase Agreement

Example of 1-day Reverse Repurchase Contract



Instruments: Repurchase Agreement

Suppose you have entered a repurchase agreement to borrow 100 million baht for 1 day at the repo rate of 2.25%. Calculate the interest payment of this contract.

$$\text{Interest Payment} = \text{Principal x repo rate x } \frac{d}{365}$$

$$= 100{,}000{,}000 \text{ x } 2.25\% \text{ x } \frac{1}{365}$$

$$= 6{,}164.38$$

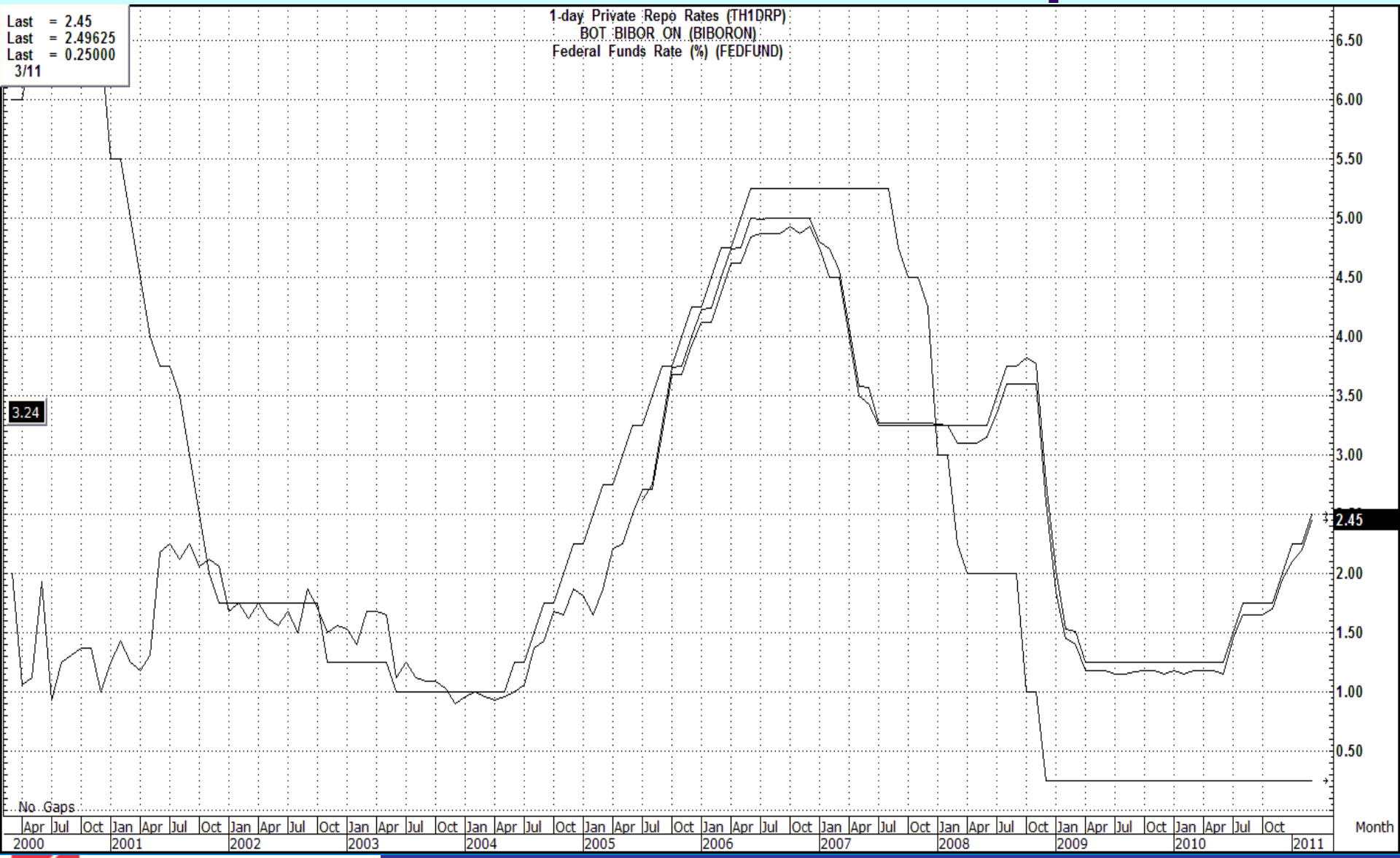
Instruments: Repurchase Agreement

There are 2 types of repo transactions

1. Bilateral Repo - banks borrow and lend with the Bank of Thailand. So the BOT always act as a counterparty.
   - *This is a large market, with volume up to 0.5 trillion baht/day*
   - *Standard maturities are 1-day, 7-day, and 14-day.*
2. Private Repo – banks borrow from each other. Non-bank businesses and investors can participate as well.
   - *Volume is still small, largely because players are not willing to take credit risk when the counterparty is a private company.*

- Note that the BOT can use *repurchase* and reverse repurchase transactions to temporarily add or *drain* reserves available to the banking system. This is through the Open Market Operations (OMOs)
- The Monetary Policy Committee (MPC), under the BOT, set *1-day repurchase rate* as the key policy rate to be used for conducting monetary policy.

US Fed Fund Rate vs. Thai Repo Rate



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Federal Funds

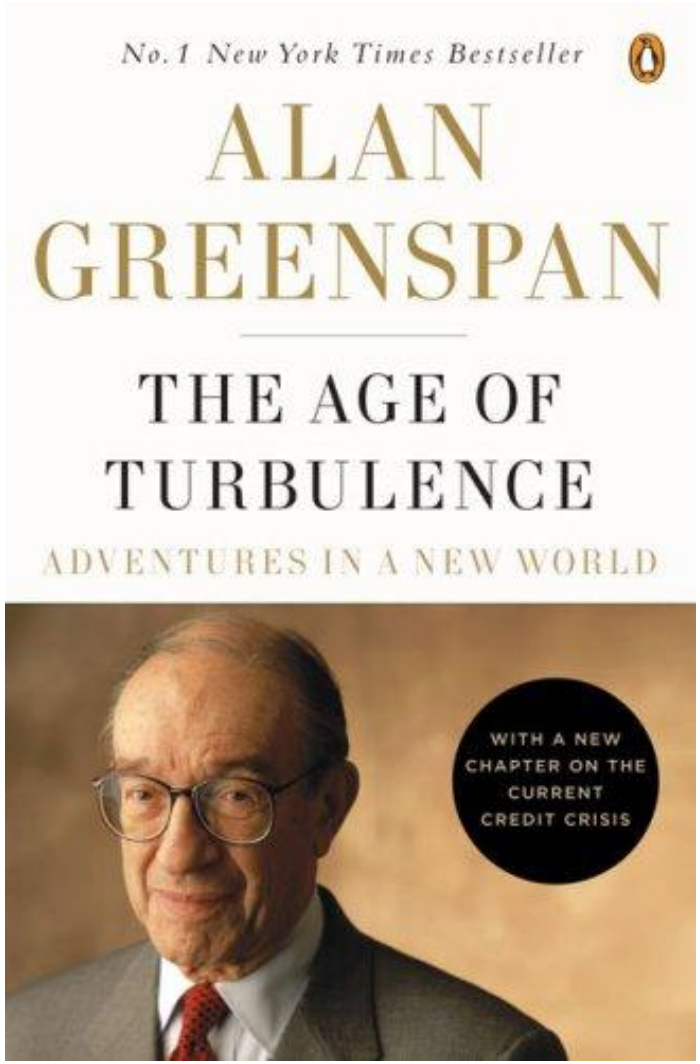
- **Federal funds** are short-term funds transferred (loaned or borrowed) between financial institutions, usually for a period of *one day or overnight*.
  - The law requires banks to keep a certain percentage of their customer's money on reserve, where the banks earn no interest on it.
  - Consequently, banks try to stay as close to the reserve limit as possible without going under it, lending money back and forth to maintain the proper level.

- *Notice that the transactions of Federal Funds in the US is equivalent to the Thai interbank*

Federal Funds

- Participating banks will quote there own fed fund rates. So the rates are determined by market forces.
- **Federal Open Market Committee (FOMC)**, under the Federal Reserve, set the target fed funds rate as the key policy rate. It is used to control the supply of available funds and hence, inflation and other interest rates.
  - *Raising the rate makes it more expensive to borrow. That lowers the supply of available money, which increases the short-term interest rates and helps keep inflation in check.*
  - *Lowering the rate has the opposite effect, bringing short-term interest rates down*

Suggested Reading



If you want to learn more about the Federal Reserve, this book is recommended.

It is about Greenspan's experiences working in the command room of the global economy for more than 18-years as Chairman of the Federal Reserve Board, from 1987 to 2006.

Eurodollars

- **Eurodollars** represent Dollar denominated deposits held in foreign banks.
  - The market is essential since many foreign contracts call for payment is U.S. dollars due to the stability of the dollar, relative to other currencies.
  - The market has continued to grow rapidly because depositors receive a higher rate of return on a dollar deposit in the Eurodollar market than in the domestic market.
  - Multinational banks are not subject to the same regulations restricting U.S. banks and because they are willing to accept narrower spreads between the interest paid on deposits and the interest earned on loans.

Eurodollars

- Some large London banks act as brokers in the interbank Eurodollar market. Banks around the world park their excess liquidity in this market.
- Essentially, Eurodollars = global interbank market.
- Eurodollars Rates:
  - London interbank bid rate (LIBID)
    - The rate paid by banks buying funds (= borrowing)
  - London interbank offer rate (LIBOR)
    - The rate offered for sale of the funds (= lending)
  - Time deposits with fixed maturities
    - Largest short term security in the world

The Birth of the Eurodollar

- *The Eurodollar market is one of the most important financial markets, but oddly enough, it was fathered by the Soviet Union.*
- *In the 1950s, the USSR had accumulated large dollar deposits, but all were in US banks. They feared the US might seize them, but still wanted dollars. So, the USSR transferred the dollars to European banks, creating the Eurodollar market.*