TOPIC 4 - OVERVIEW

1. OVERVIEW

1.1 What is Debt?

- Initial amount that the lender lends is called the *principal*, which has to be repaid according to a repayment schedule
- The level of interest charged is a function of economic conditions and the creditworthiness (default risk) of the borrower

1.2 Debt Securities

- Borrowers can raise funds by issuing debt securities which are bought by the lenders
- If issuers go bankrupt, debt holders can claim the assets of the issuers prior to shareholders
- Debt securities are also referred to as *fixed income* securities and the debt market that they are traded on is known as the *fixed income market*

1.3 Advantages of Investing in Debt Securities

- Lower risk than equities in normal circumstances
- Stable and predictable source of income
- Usually a higher yield than bank deposit rates

1.4 Characteristics of Debt

- Different categories of debt have the following characteristics:
  - **Short-term or long-term**: debt timeframe is also known as debt maturity. Debt issued with a maturity of *one year or less* is considered **short-term**; debt issued with a maturity of *more than one year* is considered **long-term**
  - **Calculation of interest:** calculation depends on: whether the rate is fixed or floating; payment period frequency; and simple vs compound
  - **Secured or unsecured:** a secured loan will give debt holders access to assets of the borrower if the borrower defaults, whereas an unsecured loan has no security guarantee
  - **Repayment structure:** principal can amortize over time or be repaid at maturity. Interest can be repaid over the period of the loan or added to the capital and repaid at a later date
  - **Currency**: may be domestic or foreign. Types of foreign debt issued in domestic currency are known as foreign bonds, including:
    - **Yankee bonds**: US dollar denominated debt issued by non-US issuers in the US
    - **Bulldog bonds**: GBP sterling denominated bonds issued by non-UK issuers in the UK
    - **Samurai bonds**: Japanese denominated bonds issued by non-Japanese issuers in Japan
    - **Panda bonds**: RMB denominated bonds issued by non-Chinese issuers in mainland China

- **Underlying options**: debt securities that offer options to issuers or investors include:
  - **Callable bonds:** issuer has right to redeem the bond after a specified date and before maturity (*embedded call option*)
  - **Puttable bonds:** holder has right to sell bond back to issuer and redeem principal at a specified date prior to maturity (*embedded put option*)
  - **Convertible bonds:** holder has right to convert bond into equity shares, or other debt instruments. If bond not converted, issuer must redeem on maturity

1.5 Interest Rates

- Interest rates determine the value of debt and may be *fixed* or *floating*

1.5.1 Calculating Interest Rates

- Interest is calculated in one of two ways:

Simple Interest

- Interest is calculated on a constant principal amount throughout period of loan

Formula: Interest earned over a number of periods

= loan principal x interest rate per period x number of periods

Simple Interest Example
Calculate the amount of simple interest and the total amount obtained at maturity on a deposit of HKD500,000 after four years with an interest rate of 3%

Answer
Interest = 500,000 x 3% x 4 years

= HKD60,000

Deposit at maturity = 500,000 + 60,000
HKD560,000

Compound Interest

- Interest is calculated assuming all interest income earned is reinvested at the same interest rate and with the principal growing each period

Formula: Amount received at maturity

$$= \text{loan principal} \times \left(1 + \frac{\text{interest rate per period}}{\text{int payments per period}}\right)^{\text{periods x payments per period}}$$

Compound Interest Example
HKD10,000 is invested for three years at a compound interest rate of 10% per annum. What will the deposit be worth at the end of the three-year period and how much interest will have been earned?

Answer
FV = $10,000 \times (1 + (0.10/1)^{3 \times 1}$
= $10,000 \times 1.1^{3}$
= HKD13,310
Interest = 13,310 – 10,000
= HKD3,310

1.5.2 Quoting Interest Rates

- There are three common methods of quoting interests:
  - **Nominal interest rates:** the most common method where no account is taken of compounding
  - **Real interest rates:** does not include the inflation element of nominal interest rates

    (1 + nominal rate) = (1 + real rate) x (1 + inflation rate)
  - **Effective interest rates**: includes the effect of compounding. To compare nominal interest rates with different compounding periods, the following formula is used:

    Formula: $\text{Effective interest rate} = \left(1 + \frac{\text{nominal interest rate}}{\text{int payments per year}}\right)^{\text{payments per year}}$

Effective Interest Rate Example
Calculate the effective annual interest rate (EAR) for the following three nominal interest rates.

- *5.50% paid monthly*
- *5.75% paid quarterly*
- *6.00% paid semi-annually*

Answer
5.50% paid monthly
EAR = $(1 + (0.055/12)^{12} - 1$
= 5.64%

5.75% paid quarterly
EAR = $(1 + (0.0575/4)^{4} - 1$
= 5.88%

6.00% paid semi-annually
EAR = $(1 + (0.06/2)^{2} - 1$
= 6.09%

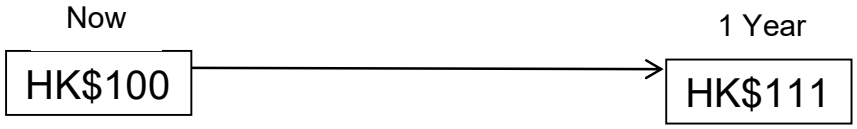
2. CATEGORIZATION OF BONDS

- There are three types of bonds, which are a form of fixed income securities:
  - **Fixed rate bonds**: the coupon (interest payment) on a fixed rate bond remains constant throughout the life of the bond. Cash flows paid to investors can be predetermined providing a regular income. Most common type in Hong Kong
  - **Floating rate bonds**: the coupon is based on a reference rate, such as HIBOR. The bond's interest rate is reset at regular intervals to reflect changes in the underlying reference rate
  - **Zero coupon bonds**: no coupons are paid during the life of the bond. These bonds are issued at a discount to face value with the full principal being repaid on maturity

3. FUNDAMENTALS OF PRICING DEBT SECURITIES

3.1 Time Value of Money

- Money deposited now will grow in value over time due to interest accumulation
- HK$100 invested now at 11% per annum will be worth HK$111 in one year's time

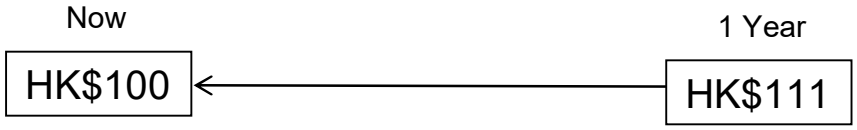


$$FV = PV\left[1 + \frac{\text{Interest rate}}{\text{Periods in year}}\right]^{\text{Payments per period x no of periods}}$$

$$FV = 100\left[1 + \frac{0.11}{1}\right]^{1 \times 1}$$

$$= 111$$

- ….and so it follows, that HK$111 received in one year's time will be worth HK$100 today, assuming an interest rate of 11% for the year ahead



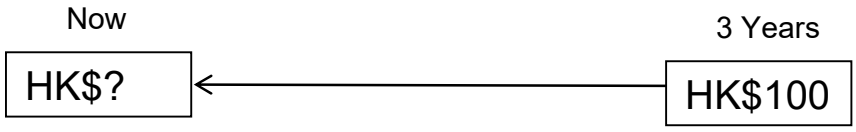
$$PV = \frac{FV}{\left[1 + \frac{\text{Interest rate}}{\text{Periods in year}}\right]^{\text{Payments per period x no of periods}}}$$

$$PV = \frac{111}{\left[1 + \frac{0.11}{1}\right]^{1 \times 1}}$$

$$= 100$$

3.2 Pricing of Zero Coupon Debt Securities

- Zero coupon debt securities are issued at a discount to face value and are redeemed at face value, thereby providing a capital gain. As the name suggests, no coupons are paid
- The implied interest rate of the security is referred to as the yield
- A zero coupon bond with a face value of HK$100, with three years to maturity, providing an annual yield of 5%, will be priced at HK$86.38



$$PV = \frac{100}{\left(1 + \frac{0.05}{1}\right)^{1 \times 3}}$$

$$= 86.38$$

3.3 Pricing of Coupon Debt Securities

- The price/value of a coupon security is the sum of the present values of all future cash flows
- Future cash flows comprise of coupon payments and the principal repayment
- A three-year 10% coupon bond, with a face value of HK$100, providing a yield of 8% will be priced at HK$105.17

Year	Cash Flow	Amount (HK$)	Discount Factor	PV of Cash Flow
1	Coupon	10	0.926	9.26
2	Coupon	10	0.857	8.57
3	Coupon	10	0.794	7.94
3	Principal	100	0.794	79.40
				105.17

$$P = \frac{10}{(1.08)^1} + \frac{10}{(1.08)^2} + \frac{10}{(1.08)^3} + \frac{100}{(1.08)^3}$$

$$= 9.26 \quad 8.57 \quad 7.94 \quad 79.4$$

$$= 105.17$$

3.4 Credit Ratings

- A major risk of investing in debt securities is the chance that the issuer is unable to make the repayments, referred to as default risk
- The higher the default risk, the higher the yield required by investors to invest. Conversely, the lower default risk with strong issuers, the lower interest they need pay
- Credit rating agencies (CRAs) provide credit ratings for specific debt issues, helping investors decide on appropriate yields leading to the prices that they are willing to pay for the investments

4. ROLE OF THE YIELD CURVE

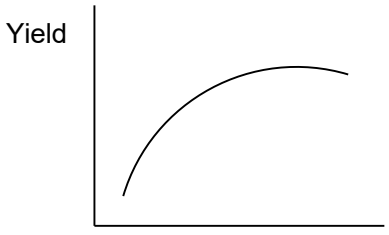
4.1 Yield versus Price

- The yield of a security is its effective annual return expressed as a percentage of the current market price and is determined by a number of factors, including:
  - **Risk profile**: the higher the risk of a security, the higher the risk premium within the yield, resulting in a lower price
  - **Term**: investors who invest for the longer term, expect a higher return (yield) to compensate for lack of liquidity and opportunity cost
  - **Taxation**: securities offering tax benefits will trade at lower yield as they are more attractive than similar securities without benefits
- Remember: ***The higher the yield, the lower the price, and the lower the yield, the higher the price***

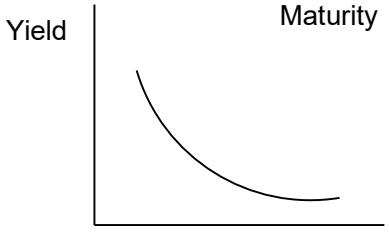
4.2 What is the Yield Curve?

- The yield curve is a line plotting the yields of selected benchmark securities of the same type, with different maturities from short- to long-term
- Yield curves are considered by country and by market and are used to forecast the future direction of interest rates and inflation
- Benchmark securities selected are usually highly rated government-issued debt securities, such as US treasury bonds
- Non-government securities, such as corporate debt, are considered to be higher risk than government securities. Yields will be above those of government debt reflecting a premium that compensates investors for the higher risk

4.3 Types of Yield Curve



Positive or Normal
Yield increases with an increase in term to maturity. The longer the term, the greater the uncertainty, the higher the required return. Consistent with expectations of rising inflation.



Negative or Inverse
Opposite to the positive yield curve where longer term interest rates are expected to be lower than current and short-term interest rates.

Flat
Can reflect expectations of stable interest rates or the transition from a positive to a negative yield curve, or vice versa.

5. THE HONG KONG DEBT MARKET

5.1 Development of the Hong Kong Debt Market

- Given Hong Kong's consistent budget surplus, the HKSAR Government has had no need to raise capital by issuing debt. However, Government initiatives in recent years have led to an active secondary debt market in Hong Kong
- The HKMA issues a number of debt securities on behalf of the Government, including:
  - Exchange Fund Bills (EFBs)
  - Exchange Fund Notes (EFNs)
- The HKFE accepts EFBs and EFNs as margin collateral for trading in stock options and futures, thereby increasing HKD fixed-income market liquidity

Implementation of the Exchange Fund Bills and Notes Issuance Programme

- **Exchange Fund Bills** are short-term Hong Kong Government debt securities auctioned regularly by public tender. Maturities are 91 days, 182 days and 364 days
- **Exchange Fund Notes** are medium to long term Government securities. EFNs with tenors of three years or more are progressively being replaced by Government Bonds from January 2015

The Listing of Exchange Fund Notes on Stock Exchange of Hong Kong

- HKMA lists EFNs on the SEHK to encourage retail investment in debt securities which helps develop a liquid debt market
- The turnover of EFBs and EFNs in the secondary market reached HKD2,700 billion in July 2019

Establishment of The Hong Kong Mortgage Corporation Limited (HKMC)

- HKMC was established in March 1997 as a public company, wholly owned by the Government through the Exchange Fund
- HKMC's key objective is to develop Hong Kong's secondary mortgage market, involving the purchase of mortgage loans for its own portfolio and securitizing mortgages as mortgage-backed securities (MBS)

Renminbi Debt Market

- Hong Kong is fast becoming China's financial hub for RMB denominated debt (known as "dim sum bonds")
- The first issue of RMB debt to public investors was made by China Development Bank in 2007, raising RMB5 billion
- In 2010, institutions other than mainland financial institutions were able to issue RMB debt, including corporations registered in China and abroad

Mutual Debt Market

- Bond Connect is a mutual bond market access programme between Hong Kong and Mainland China established in July 2017
- Only Northbound trading is currently underway allowing overseas and Hong Kong investors to access the China Interbank Bond Market

Securities Margin Financing

- Securities margin financing involves securities being used as collateral to allow the purchase of further exchange-traded securities
- EFBs and EFNs are used as collateral for trading in shares and stock options listed on the SEHK and in futures on HKFE

Repurchase Agreements

- One party sells securities to another in return for cash, with an agreement to repurchase equivalent securities at an agreed (higher) price, on an agreed future date
- The repo buyer (who sells the securities) is able to source funds to cover any liquidity shortfall
- A repo can be thought of as a short-term secured loan with collateral
- Widely used by central banks and the money market to relieve money market shortages
- In Hong Kong, banks can obtain temporary liquidity from the HKMA (discount window) by using repos with EFBs and EFNs as collateral

Tax Exemptions and Concessions

- Tax exemptions and concessions have been used to encourage Hong Kong debt market development
- For example, EFBs, EFNs and Government Bonds are exempt from Hong Kong profits tax and stamp duty

Foreign Reserve Backing

- EFBs and EFNs are denominated in HKD, issued by the HKMA and are effectively backed by Hong Kong's foreign reserves (Exchange Fund)

Government Bond Programme

- The Hong Kong Government believes that an active bond market is important to maintain Hong Kong's status as an international financial centre
- To help develop the local bond market, the Government announced a Government Bond Programme in 2009. Bonds are currently issued under the Programme with maturities of 2 to 10 years
- The maximum outstanding balance under the Programme was initially HKD100 billion, which has been subsequently increased to HKD200 billion

Other Initiatives

- Other initiatives to encourage debt trading include the introduction of regulated short selling and the establishment of a market-making system by the HKMA

5.2 Structure of the Debt Market

- Predominantly OTC, with participants linked by telephone/internet. Four categories of the debt market are:
  - Primary and secondary
  - Short-term and long-term
  - Government and non-government (private)
  - Structured Finance and Securitized Debt

Primary and Secondary Debt Markets

- **Primary market** is where debt securities are first issued to investors
- EFBs, EFNs, Government Bonds and quasi-government notes (eg HKMC) are issued on the primary market through a **competitive tender system**
- Primary issues for **corporate debt** securities are usually through a process of syndication, where the IPO is organized by a group of financial intermediaries
- **Underwriters** guarantee to provide funds in the event of a shortfall in subscriptions to borrowers
- **Secondary market** is where issued debt securities are traded, predominantly OTC through recognized dealers and market makers
- To encourage development of Hong Kong's debt markets, some debt securities have been **listed on the Stock Exchange of Hong Kong**
- The **listing of EFNs** has enabled conservative investors to achieve capital gains at lower risk

Short-term and Long-term Debt Markets

- The **short-term** debt market (aka money market) involves debt securities with **maturities of up to one year**
- Financial intermediaries and HKMA (**interbank market**) are the major money market participants
- The **long-term** securities market (aka fixed income market/interest rate market/bond market) involves debt with maturities of **more than one year** with the major participants being fund managers, financial intermediaries, corporations, supranationals and government bodies

Government and Non-Government Debt Securities

- Yields on government debt with high credit ratings are considered **risk-free** and can be used as benchmark rates to price non-government debts
- Foreign government debt securities carry **foreign currency risk**
- Hong Kong's non-government debt market tends to be more active than the government debt market

Structured Finance and Securitized Debt

- There are three sectors of the structured finance market:
  - **Securitization**: takes assets, such as individual mortgages, and repackages the underlying the cash flows into relatively liquid securities. The market consists of mortgage-backed securities (MBS) and asset-backed securities (ABS). Although the government is keen to develop this market, progress has been slow
  - **Collateralized debt obligations (CDOs)**: a series of underlying loan products repackaged into a number of security tranches with different characteristics
  - **Asset-backed commercial paper**: a wide variety of debt backs the issuance of commercial paper

5.3 Types of Debt Securities

Short-term Debt Securities

- **Interbank placement funds**: large amounts of cash move between AIs and the HKMA on a daily basis, with AIs being major participants in the interbank money market. HIBOR, which is set at 11.00am each day, is an average of the quoted yields from 20 selected AIs, and is given for 1-month, 3-month and 6-month tenors
- **Government bills**: Exchange Fund Bills issued by the HKMA through the Exchange Fund. Yields for 91-day, 182-day and 364-day bills are considered as Hong Kong's risk-free rates
- **Negotiable certificates of deposit**: AIs issue certificates of deposit (CDs) to certify particular amounts of money deposited with them. As AIs are the issuers, they are considered low-risk instruments. Holders are entitled to the money on deposit at maturity, which may range from a few days to six months
- **Bankers' acceptances**: or bills of exchange are issued by individuals/corporations and accepted by banks. A bank agrees to pay a bill's face value to the holder at the bill's maturity
- **Commercial bills**: issued by corporations and accepted by banks. Used to finance working capital or business expansion. Tend to trade at higher yields than bankers' acceptances
- **Promissory notes/commercial papers**: agreements to repay certain amounts of money at specified future dates (usually less than six months). Only involve two parties: issuers and holders

Long-term Debt Securities

- **Government bonds**: involves Exchange Fund Notes issued by the HKMA through the Exchange Fund and the Government Bond Programme, launched in 2009
- **Semi- or quasi-government bonds**: bonds issued by organizations wholly or partly owned by the government, such as HKMC, MTRC, KCRC and HKAA
- **Corporate bonds**: generally medium-term to long-term with maturities ranging from 1 to 10 years

- **Eurobonds**: bonds issued in a currency other than that of the issuing country. US issuers started issuing USD bonds in Europe in the 1960s to avoid US domestic controls on interest rates. Issued by corporations, international bodies and supranationals
- **Supranational bonds**: issued by multilateral agencies and overseas entities such as the European Bank for Reconstruction and Development and the International Bank for Reconstruction and Development

5.4 Participants in the Debt Market

- **Issuers of debt securities**: as outlined above, these include the Government, semi- or quasi-government entities, authorized institutions, corporations and supranational or multilateral organizations
- **Investors in debt securities**: in Hong Kong, mainly institutional investors. The Government, fund managers and insurance companies invest in long-term debt. AIs and corporations invest in short-term debt. Hong Kong retail investors tend to invest in equity
- **Brokers and traders**: dealers form broker panels to underwrite primary issues and actively buy debt investments on the secondary market for investors
- **Regulators**: debt dealers and advisers in Hong Kong must be either licensed or registered with the SFC
- **Credit rating agencies**: provide independent research and assign credit ratings to debt securities

5.5 Trading and Settlement Systems

- Debt trading in Hong Kong is principally carried out by telephone during business hours
- The Central Moneymarkets Unit (CMU) was established by the HKMA in 1990 to provide clearing, settlement and custodian services for traded debt.
- An interface was set up in 1996 between the CMU and the RTGS to perform real time or end-of-day delivery-versus-payment settlement of HKD debt investments