

## **ACF 304 – Exam structure**

### **ACF304**

Section A (30 marks): Thirty multiple choice questions each worth 1 marks. Each question contains 4 possible answers A, B, C, D. There is no penalty for blank answers. No negative marking.

Section B (40 marks): Contains ten questions of which eight need to be answered. Each question is worth 5 marks.

With each question worth 5 marks we're looking for a relatively substantial answer i.e. approx. 8-10 written lines, making 6 or 7 points if possible. NOT bullet pointed.

Section C (15 marks): Contains eight questions. All of which must be answered. Questions are worth 1, 2, or 3 marks.

A number of them will directly relate to a chart, table with data, news articles asking for your interpretation. A number of questions will not directly relate to data but relate to the concepts being asked.

Section C answers should be 1, 2, 3 or 4 written lines only.

Section D (15 marks): Contains four questions of which three must be answered. Each question is worth 5 marks.

A more formal definition of a concept perhaps with reference to the real world e.g. Exchange Traded Funds and their popularity with investors over the last several years. At 5 marks each a length of answer similar to Section B answers is required – 1 or 2 paragraphs, approx. 8 - 12 lines of information. NOT bullet pointed.

## ACF 304 – Week 1 – Overview of financial system

### Function of financial markets

Role as financial intermediaries – connecting borrowers and savers/investor

Channels funds from person or business without investment opportunities (i.e., “Lender-Savers”) to one who has them (i.e., “Borrower-Spenders”)

This improves economic efficiency

Lenders/savers: households, business firms e.g. Apple/Amazon, government (with budget surpluses e.g. Germany, Norway), foreign entities.

Borrowers/spenders: business firms (borrow money to achieve goals), governments e.g. US \$1 trillion budget deficit.

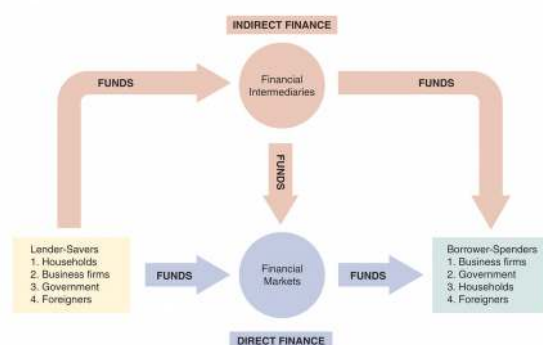
Government borrowing has ballooned in 2020 – e.g. UK borrowing at £208.5 billion in September 2020 compared to £34 billion in September 2019.

### Segments of Financial Markets

**Direct Finance** – Borrowers borrow directly from lenders in financial markets by selling financial instruments (securities) which are claims on the borrower’s future income or assets.

**Indirect Finance** – Borrowers borrow indirectly from lenders via financial intermediaries (established to source both loanable funds and loan opportunities).

Securities are assets for the person who buys them, but they are liabilities (IOUs or debts) for the firm or government that sells them.



Financial markets are critical for producing an efficient allocation of capital, allowing funds to move from people who lack productive investment opportunities to people who have them. Financial markets also improve the well-being of consumers, allowing them to time their purchases better e.g. a 30-year mortgage, a credit card payment. In 2019 91% of new cars in UK purchased on finance.

### Structure of financial markets

Debt markets:

- Short-Term (maturity < 1 year)
- Long-Term (maturity > 10 year)
- Intermediate term (maturity in-between)
- Represents a loan to the company/government
- Bond/loan has an interest payment associated

\$39.7 trillion bonds outstanding today (US). 35% of this is US treasuries.

Equity Markets:

- Pay dividends, in theory forever and is variable.
- Represents an ownership claim in the firm. – own a piece therefore entitled to a share of profits. Benefit from increased profitability through dividends and increased

share price, but reverse is also true. You are a residual claimant i.e. debt holders paid first.

Total value of all U.S. equity is just over \$30 trillion today.

### Primary Market

- New security issues sold to initial buyers
- Typically involves an investment bank who underwrites the offering – guarantees a company a certain price per share, the IB gain/lose depending on the price these new shares for.

### Secondary Market

- Securities previously issued are bought and sold
- Examples include the NYSE and NASDAQ, TRADEWEB (bond marketplace)
- Involves both brokers (doesn't own shares just connects buyer and seller – executes order) and market-makers (give you prices immediately, takes on risk and owns asset).

Secondary market functions:

- Provides liquidity, making it easy to buy and sell the securities of the companies.
- Establishes a price for the securities (useful for company valuation).
- Provides useful security financial information e.g. legal information.
- Provides useful customer information e.g. market trends providing info to IBs which sectors are more attractive.
- An investment bank will not win a lucrative primary market mandate e.g. US equity IPO, unless it has a strong Secondary market presence

Secondary market classification

**Exchanges** – Trades conducted in central locations (e.g., New York Stock Exchange, CBOT)

**Over-the-Counter Markets** – dealers at different locations buy and sell e.g. the market for US Treasury Securities can go to any main bank. Others e.g. German Govt Bonds, Foreign Exchange.

Can also classify markets by maturity:

**Money Market:** Short-Term (maturity < 1 year)

**Capital Market:** Intermediate (1-10) & Long-Term (> 10 years) Debt and equities (no maturity).

Buy side (have the money to invest in products/services produces by the IBs) – AMs, Pension funds, insurance companies, hedge funds, private wealth.

Sell side – IB and interdealer brokers (middlemen organising trades between IBs).

IBs are trying to grow their AM arms as they require little capital to operate and generate consistent fees. IB trading is a profit volatile business and requires lots of capital.

Retail banking is also a low profit business in today's low interest rate environment.

### Different sectors in Banking

	Investment Banking (IBD)	Global Markets	Corporate Banking	Private Banking	Retail Banking
FRONT - OFFICE	Mergers & Acquisitions (defending and buying) Leveraged Finance (lending to entities e.g. to acquire)	• Sales/Trading • Research (advising clients on markets)	• Corporate bankers (running and structuring businesses)	Private Bankers (Wealth Managers)	• Retail bankers (Day-to-day retail & small business transactions)
MIDDLE - OFFICE		• Risk Management			
BACK - OFFICE		• Operations (processing trades)			
Group functions (e.g. Strategy, CFO, HR, Marketing)					

Investment Banking

### Function of financial intermediaries – indirect finance

Instead of savers lending/investing directly with borrowers, a financial intermediary (such as a bank) plays as the middleman:

- The intermediary obtains funds from savers
- The intermediary then makes loans/investments with borrowers
- e.g. a bank might launch a new savings account for investors that households may invest in. The bank then uses those deposits to make a loan to General Motors or a loan to the US Government by buying a US Treasury Bond.

This process is **financial intermediation**, which is the primary means of moving funds from lenders to borrowers.

Needed because of transactions costs, risk sharing, and asymmetric information.

More important source of finance than securities markets (such as raising money through stocks i.e. Direct Finance). E.g. In Germany and Japan, **financing from financial intermediaries exceeds capital market financing 10-fold**.

### Transaction costs

Financial intermediaries make profits by reducing transactions costs.

Reduce transactions costs by developing expertise and taking advantage of economies of scale e.g. financial intermediaries use lawyers to write up tight contracts, they spread the cost of lawyer over its many customers (much cheaper than individuals writing up 1 contract).

A financial intermediary's low transaction costs mean that it can provide its customers with **liquidity services**. Services that make it easier for customers to conduct transactions

- Banks provide depositors with bank accounts that enable them to pay their bills easily.
- Depositors can earn interest on bank/savings accounts and yet still convert them into goods and services whenever necessary.

Another benefit made possible by the FI's low transaction costs is that they can help reduce the exposure of investors to risk, through a process known as **risk sharing**.

- FIs create and sell assets with lesser risk to one party in order to buy assets with greater risk from another party.
- This process is referred to as **asset transformation**, because in a sense risky assets are turned into safer assets for investors e.g. asset-backed securities.

Financial intermediaries also help by providing the means for individuals and businesses to **diversify** their asset holdings.

Low transaction costs allow them to buy a range of assets, pool them, and then sell rights to the diversified pool to individuals e.g. a private investor invests \$20,000 in a US equity investment fund.

### **Asymmetric information**

One party lacks crucial information about another party, impacting decision-making e.g. a borrower who takes out a loan has better information about the potential risks and returns associated with the investment process than the lender does.

#### **Adverse selection:**

- Happens before transaction occurs
- Potential borrowers most likely to produce adverse outcome are ones most likely to seek a loan. More likely to be bad credit risks.
- Similar problems occur with insurance where unhealthy people want their known medical problems covered.

#### **Moral hazard:**

- Happens after transaction occurs
- Hazard that borrower has incentives to engage in undesirable (immoral) activities making it more likely that won't pay loan back.
- E.g. with insurance, people may engage in risky activities only after being insured.

Financial intermediaries reduce adverse selection and moral hazard problems, enabling them to make profits. E.g. expertise to screen out bad credit risks and reduce moral hazard by monitoring the parties they lend to.

### **Internationalisation of financial markets**

US no longer dominates world stage

International Bond Market & Eurobonds

#### **Foreign bonds**

Sold in a foreign country and denominated in that country's currency e.g. New Zealand issuing a GBP bond in UK regulated domestic bond market

#### **Eurobonds**

Denominated in a currency other than that of the country in which it is sold e.g. NZ\$ bond in Europe.

Now larger than U.S. corporate bond market. Over 80% of new bonds are Eurobonds.

**Eurocurrency Market** (FX not bonds) – terms are nothing to do with the EUR/Euro

Foreign currency deposited outside of home country

**E.g. Eurodollars are U.S. dollars deposited in London.**

Gives U.S. borrowers an alternative source for dollars.

World Stock Markets – U.S. stock markets are no longer always the largest -at one point, Japan's was larger.

The 3 main US Stock Exchanges:

Dow Jones Industrial Average – 30 largest publicly traded corporations.

Standard & Poor's (S&P) 500 – largest 500 companies traded in US

NASDAQ – index of technology stocks.

**FTSE 100** – index of the 100 most highly capitalized UK companies listed on the London Stock Exchange.

**DAX** – index of the 30 largest German companies trading on the Frankfurt Stock Exchange.

**CAC 40** – index of the largest 40 French companies traded on Euronext Paris.

**Hang Seng** – index of the largest companies traded on the Hong Kong stock markets.

**Nikkei 225** measures the performance of 225 large, publicly owned companies in Japan from a wide array of industry sectors.

The U.S. has lost its dominance in many industries e.g. automobiles and consumer electronics. And now a similar trend appears for U.S. financial markets, as London and Hong Kong compete. Many U.S. firms use these markets over the U.S.

- How much will Brexit adversely affect London financial markets? – doesn't seem to large an impact just yet.
- US markets now have Amazon, Apple, Microsoft and Netflix listed and trading there so such US markets are increasing in importance again.

Reason for this decline in US?

- New technology in foreign stock exchanges
- 9 -11 made U.S. regulations tighter
- Greater risk of lawsuit in the U.S – e.g. with listings of companies
- Sarbanes-Oxley has increased the cost of being a U.S.-listed public company – after accounting scandals.

## ACF 304 – Week 2 Financial Crises (occurrence and impact)

Financial crises are major disruptions in financial markets characterised by sharp declines in asset prices and firm failures.

**Adverse selection** and **moral hazard** are still present in markets – the study of these problems is the basis for understanding and defining a financial crisis.

Asymmetric information creates barriers between savers and firms with productive investment opportunities.

A financial crisis occurs when information flows in financial markets experience a large disruption. Financial markets may stop functioning completely e.g. 2008.

Financial crises typically occur every 20-30 years. In 3 stages:

### **Stage 1 – initial phase:**

They can begin in several ways

- **Credit boom and bust**
- **Asset price boom and bust**
- Increase in **uncertainty**

Financial crisis can begin with mismanagement of financial liberalisation or innovation:

- Elimination of restrictions (Trump – stock market rise making him more popular & Dodd Frank)
- Introduction of new types of loans or other financial products (Mortgage Backed Securities, CDS). Leads to a credit boom, where risk management is lacking.
- Government safety nets reduce the incentives for proper risk management. Depositors ignore bank risk-taking as they believe they will be paid back e.g. The Greenspan 'Put' (monetary policy response to crisis - 1987).
- Eventually, loan losses accrue, and asset values fall, leading to a reduction in capital.
- Financial institutions cut back in lending, a process called deleveraging. Banking funding falls as well (from short term money markets).
- As FIs cut back on lending, no one is left to evaluate firms. The financial system loses its primary institutional function to address adverse selection and moral hazard.
- Economic spending contracts as loans become scarce.

A financial crisis can also begin with an **asset-price boom and bust**:

- A pricing bubble starts, where asset values exceed their fundamental values.
- When the bubble bursts and prices fall, corporate net worth falls as well. **Moral hazard** increases as firms have little to lose (encouraged to take more risk).
- FIs also see a fall in their assets, leading again to deleveraging – unwilling to make loans.

Finally, a financial crisis can begin with an increase in uncertainty:

- Periods of high uncertainty can lead to crises, such as stock market crashes or the failure of a major financial institution. e.g. 2008, when AIG (CDS exposure), Bear Sterns and Lehman Bros. failed
- With **information hard to come by**, moral hazard and adverse selection problems increase, reducing lending and economic activity.

### **Stage 2 – Banking crisis:**

Deteriorating balance sheets lead financial institutions into insolvency. If severe enough, these factors can lead to a bank panic.

- Panics occur when depositors are unsure which banks are insolvent, causing all depositors to withdraw all funds immediately.
- As cash balances fall, FIs must sell assets they hold quickly (which have dropped in value), further deteriorating their balance sheet.
- Adverse selection and moral hazard become severe – it takes years for a full recovery.

### **Stage 3 – Debt deflation:**

If economic downturn leads to a sharp decline in overall price levels of economy, recovery process is very difficult.

- E.g. a firm in 2015 with assets of \$100 million, \$90 million of long-term liabilities, and so \$10 million in net worth.
- Price levels fall by 10% in 2016.
- 2016 Assets value falls to \$90M.
- 2016 Liabilities (bonds it has issued) remains the same \$90M so firms net worth falls to zero.
- This is **why Central Banks target 2% not zero inflation**, so they can reduce the real debt liabilities of firms.

### **Case study – Great Depression 1929**

In 1928 and 1929, stock prices doubled in the U.S. The 'Fed' tried to curb this period of excessive speculation with a tight monetary policy (to **reduce 'buying on margin'** – to be covered in tutorial).

But this led to a stock market collapse of more than 20% in October of 1929 and losing an additional 20% by the end of 1929.

Stock market fell again in 1932 – in December 1932 stocks were worth 10% of their September 1929 value.

- What might have been a normal recession turned into something far worse, when severe droughts in 1930 in the US Midwest led to a sharp decline in agricultural production (farmers could not pay back bank loans).
- Between 1930 and 1933, one-third of U.S. banks went out of business as these agricultural shocks led to bank failures.
- For more than two years, the Fed sat by through one bank panic after another, doing nothing (contrast to recent crises).

Adverse selection and moral hazard in credit markets became severe.

Firms with productive uses of funds were unable to get financing. **Credit spreads** (amount of interest a corporate has to pay on issued bonds compared to the government) increased from 2% to nearly 8% during the height of the Depression in 1932.

- The deflation during the period led to a 25% decline in price levels.
- The prolonged economic contraction led to an unemployment rate around 25%.
- Bank panics in the U.S. spread to the rest of the world, and the contraction of the U.S. economy decreased demand for foreign goods.

### **Mortgaged backed securities**



### US Agency Mortgage-backed securities:

**Fannie Mae** – Federal National Mortgage Association

**Freddie Mac** – Federal Home Loan Mortgage Corporation

Government agencies – semi-government bonds.

Purpose is to reduce the cost of capital (mortgages for house purchase) for sectors of the economy deemed important enough to warrant assistance e.g. farmers, students, homeowners.

These agencies use the mortgage loans they underwrite as collateral, to create bonds called Mortgage pass-through securities or Collateralized mortgage obligations (CMOs).

Mortgage loan:

- Loan Secured by the collateral (a real estate property): if not paid, the lender has the right to **foreclose** (seize) the property.
- Payments: **interest, scheduled principal payment, prepayments**
- Prepayments: payments in excess of the required monthly mortgage payment. E.g. occur when there is early sale of the property, natural disaster followed by insurance payment, Refinancing (paying mortgage back early) when interest rates go down (refinancing mortgages at cheaper rates with other mortgage providers to pay off higher interest mortgage).

**Prepayment risk** – the risk that my bond will be paid back early because people are paying their mortgages back early i.e. If I am a bondholder getting 8% a year interest and rates fall to 3% I do not want my 8% bond to be paid back early.

Mortgage rate/contract rate – interest rate on the mortgage

Different types of mortgages:

- **Traditional fixed-rate fully amortizing** (certain amount paid back each month - including principal repayment as well as interest)
- Floating rate
- Interest-only (fixed or floating)
- Partial amortizing (fixed or floating)

Cash flow for a level repayment **fixed rate fully amortized mortgage** assumes that the homeowner does **not pay off** any portion of the **mortgage principal balance prior** to the **scheduled payment date**.

But homeowners do pay off mortgages early – this is a prepayment risk to the lender of the mortgage or to a bondholder whose bond is based on mortgage payments.

This leads to the creation of **Mortgage Pass-through securities** (the mortgage payment is passed through to the securities/bonds) – Fannie Mae and Freddie Mac create a pool of mortgages and sell shares of this pool to investors (idea is whole pool will not be paid back early). They sell this to investors through issuing bonds.

- Monthly mortgage payments are passed through to the (bond) certificate holders on a pro rata basis

- When mortgages in the pool are collateralized, the mortgage pool is considered to be securitized (based on the specific mortgages in the pool).
- The exact cash flow amount received by the bond investor is uncertain: depends on the cash flow of the borrowers/mortgage holders in the pool (principal and interest less any servicing fees)
- Looking at 1 individual mortgage the prepayment risk is potentially high. Looking at a pool of 2000 mortgages prepayment risk is reduced.

Mortgage Pass-through Securities versus a 'Normal' Coupon Bond:

	Mortgage Pass-through	Coupon bonds
Principal payments prior to maturity	Yes	No
Payments	Monthly	Annual /Semi-annual
Payment uncertainty	Higher (prepayments)	No

#### Collateralized Mortgage Obligations:

- There are rules for the payment of interest and principal (scheduled and prepaid) to the bond classes (tranches) in the CMO
- The purpose of the CMO is to redistribute prepayment risk to different tranches (e.g. tranches A-C all receive net scheduled interest payments but will also receive all monthly principal if there is any early principal repayment by mortgage holders. With A receiving all monthly principal until completely paid off, B receives monthly principal after A paid off and so on – **early principal repayment is bad for investors hence tranche A will offer higher interest rate** on the bond to compensate).

#### CDO's

Significant growth in years until the subprime mortgage crisis (market worth just 10% of what it was)

Similar to collateralized mortgage obligation (CMO), except that the assets pledged as collateral are:

- Credit Cards
- Domestic and foreign bonds
- Bank loans
- Distressed debt
- Foreign bank loans
- Asset-backed securities
- Commercial and residential mortgage-backed securities

CDOs are packaged to provide unique income streams and risk levels (tranches)

To make CDO's a special purpose vehicle (SPV) needs to be created in order to buy assets and create securities from these assets and then sell those securities to investors.

In a CDO, the securities (or different tranches) are created based on default priorities. The first defaults go to the lowest rated tranches. The highest rated tranches only suffer defaults if most of the assets default.

- The highest rated tranches are called **super senior** tranches

- The next bucket is known as the **senior** tranche – it has a little more risk and pays a higher interest rate
- The next tranche is the **mezzanine** tranche
- The lowest tranche is the **equity** tranche - this is the first tranche that suffers losses from defaults.

## Global financial crisis 2007-2009

### Financial innovation in mortgage markets

This developed along a few lines:

- Less-than-credit worthy borrowers found the ability to purchase homes through **subprime lending** (lending to borrowers with low credit ratings), a practice almost nonexistent until the 2000s.
- Financial engineering developed **new financial products** (MBS & CDOs) to further enhance and distribute risk to investors from mortgage lending.

**Agency problems** in mortgage markets also reached new levels:

- Mortgage originators did not hold the actual mortgage, but sold the note on in the secondary market
- These agencies earned fees from the volume of the loans produced, not the quality.
- In the extreme, unqualified borrowers bought houses they could not afford through either creative mortgage products or outright fraud (such as inflated income).

Credit rating agencies caused issues:

- Credit rating agencies consulted with firms on structuring products, leading to achieving the highest rating as they earned a fee from rating their products. This created a clear conflict.
- The rating system was not designed to address the complex nature of the structured debt designs.
- The result was meaningless ratings that investors had relied on to assess the quality of their investments.

Sectors that suffered:

**Residential housing** – housing boom was originally lauded by economists and politicians.

The housing boom helped stimulate growth in the subprime market as well.

However, underwriting standards fell. People were buying houses they could not afford, except for the ability to sell the house for a higher price. Lending standards allowed for near 100% financing, so owners had little to lose by defaulting when the housing bubble burst.

Was the FED to blame for house price bubble? – low interest rate environment from 2003-2006 fuelled housing bubble. Bernanke believed rates were appropriate for conditions.

**FI balance sheets** – mortgage defaults rose, banks and other FIs saw the value of their assets fall. This was further complicated by the complexity of mortgages, CDOs, **defaults swaps**, and other difficult-to-value assets.

Banks began the deleveraging process, selling assets and restricting credit, further depressing the struggling economy.

**Shadow banking system** also experienced a run (hedge funds, investment banks, and other liquidity providers in financial system). When the short-term debt markets seized, so did the availability of credit (ability to borrow) to this system. This led to further “fire” sales of assets to meet higher credit standards.

Fall in stock market and rise in credit spreads further weakened firm and household balance sheets. Both consumption and real investment fell, causing a sharp contraction in the economy.

**Global financial markets** – Europe raised alarm bells first with downgrade of \$10 billion in mortgage related products, causing short term money markets froze.

In August 2007, a French investment house (BNP Paribas) suspended redemption of some of its money market funds.

End of credit led to bank failures e.g. Northern Rock who relied on short-term money markets for funding.

**Major financial firms** – collapse of several high-profile U.S. investment firms only further deteriorated confidence in the U.S.

- March 2008: Bear Sterns fails and is sold to JP Morgan for 5% of its value.
- September 2008: both Freddie Mac and Fannie Mae put into conservatorship after heaving subprime losses.
- September 2008: Lehman Brothers files for bankruptcy. Merrill Lynch sold to Bank of America at “fire” sale prices. AIG also experiences a liquidity crisis.

Congress passed a bailout package, but the stock market continued to decline, and **credit spreads reached over 500 bps**.

### The European Sovereign Debt Crisis

Up until 2007, all the countries that had adopted the euro found their interest rates converging to very low levels.

At the same time, several of these countries were hit very hard:

- Lower tax revenue from economic contraction
- High outlays for FI bailouts
- Fear of government default caused rates to surge

Greece was the first domino to fall

- In September 2008, government projected a 6% budget deficit and debt-to-GDP of 100% (UK today is 100%). In October, with newly elected officials, numbers were shown to be far worse
- Fear of default caused rates on Greek debt to peak at 40%
- Debt-to-GDP rose to 160% in 2012
- Greece was forced to write-down its debt (partial default)

Ireland, Portugal, Spain, and Italy followed

- Governments forced to embrace austerity measures to shore up their public finances
- Interest rates climbed to double-digit levels
- Severe recessions resulted, despite assurances from the ECB to help
- Unemployment rates rose to double-digits (25% in Spain)

- Euro survived after the announcement from Mario Draghi saying the ECB would do 'whatever it takes' to save the Euro.

## **Workshop week 2**

### **Buying on margin in stock market**

Margin – between a bank and its private customer

\$6000 to buy stocks, requirement is 30%, therefore I can buy \$20,000 of stocks (as bank provides \$14,000), fed increasing margin to 60% means I can only buy \$10,000 worth of stocks (as bank only provides \$4,000).

Therefore, Fed increasing margin requirements reduces stock speculation

### **Section B Questions**

Define key terms

Give an example

### **Section B - Why would 'haircuts' on collateral increase sharply during a financial crisis?**

#### **If a bank provides a short-term loan it wants securities as collateral**

i.e. Bank lends \$50,000 for 1 month ...client 'lends' \$50,000 stocks as collateral...what's the problem here?

A 'haircut' on a security refers to the amount of money that a lender holds back or discounts from lending e.g. If \$50,000 collateral is posted and \$45,000 is lent the haircut is 10% or \$5,000

Stock prices go down in financial crisis, increases uncertainty of assets used as collateral, therefore banks increase haircuts on collateral (lend less money on same amount of collateral – or increase collateral for same amount of loan.)

During a financial crisis, asset prices fall, often very rapidly and unexpectedly. **1 mark** This leads to the expectation that asset prices may fall further in the future **1 mark**, and increases the uncertainty over the value of assets put up as collateral. **1 mark** As a result, firms accepting collateral assets require larger and larger haircuts, or discounts on the value of collateral in expectation of future lower values. **1 mark** This requires firms to put up increasingly more collateral for the same loans over time. **1 mark**

### **How did the structure of US Mortgage Bonds instigate the 2008 Financial Crisis?**

#### **Section B - 5 marks**

- US Mortgage Bonds are known as Asset-Backed securities
- Securitised by mortgage payments from individuals homeowners.
- Subprime / low credit quality / borrowers could not afford
- AAA rated (Really? – too complex)
- Defaults
- Massive Institutional losses

US mortgage bonds are known as asset back securities, Securitised by mortgage payments by individual homeowners. Many mortgages were subprime and granted to people that could not afford them. At the same time such bonds were given a AAA rating and had complicated structures that made them hard to accurately price. As defaults happened, many bonds were worthless as house prices fell causing massive losses.

### ACF 304 – Week 3 COVID Crisis

An external event crisis, not an asset bubble crisis.

Theory of financial crisis still applies – deterioration in financial institutions balance sheets, big asset price declines, increases in uncertainty.

We had adverse selection and moral hazard.

In stage 2 we had a decline in economic activity but did not have a banking crisis and did not have severe moral hazard and adverse selection due to the level of intervention by central banks – hence did not end up in stage 3 debt deflation environment.

#### **Monetary policy:**

Fed cut its policy rate by 50bps (0.5%) to 1-1.25% - largest cut since 2008. People interpreted this as drastic causing investors to flee the stock market.

Problem was interest rates were only at 1.5-1.75% initially so did not have much room to play with e.g. 2008 rates went from 5.5% to 0%. Fed had been trying to 'normalise' interest rates for this reason (to around 3%).

As monetary policy was ineffective, large fiscal intervention required.

This fiscal injection had to be borrowed in the form of debt by issuing bonds (is the country's economy strong enough to pay the money back?) UK has > 100% debt to GDP ratio now.

US to borrow \$3tn in Q2 2019 to finance debt

#### **Bonds & rates >**

Country	2-year yield	10-year yield
Europe	-0.71%	-0.53%
Japan	-0.13%	0.05%
United Kingdom	-0.13%	0.29%
United States	0.14%	1.09%

Current rates very low – handy for paying back debt. But if rates were to rise and bonds were issued upwards of 3% it would be very costly to finance its debt.

In times of crisis investors buy government bonds (as they can print money to pay you back) and gold – at quickest pace since 2008, resulted in drop off in yields.

Corporate bonds out of favour – credit ratings downgraded at record pace. Sell off in Corporate bond (falling price) and large rise in yield. Large rise in credit spread (4.5%).

Q2 2020 there was a large issuance of corporate bonds to raise money to protect themselves from COVID despite the higher yields.

Oil price dropped below \$20 – fall in demand plus increase in supply due to OPEC/Russia spat.

US oil for immediate delivery fell to -\$40 per barrel. Oil producers paying for you to take oil away from them, as storage tanks were full. Today it is back to \$50-60 per barrel.

Gold not behaving as typical safe-haven asset in 2020 crisis, as investors take profits (i.e. sell) on gold to balance their losses on stocks.

It did in the end, by Jan 2021 close to \$2,000 per ounce.

US jobless claim at around 5.5million Jan 2021, was around full employment in 2016-19 but shot up to 25 million overnight in Covid crisis.

Loss of world market cap – fell 30% in 22 days. Compared to 260 days to fall 20% in 2008. Due to central bank intervention it rebounded quickly (regained all of the loss in the following month – S&P).

### **Where are we now?**

US stock markets at all-time highs supported by; massive central bank support, strong technology company performance – Microsoft, Facebook, Netflix, Amazon.

Economic fundamentals remain weak – but investors are looking beyond Covid (Joe Biden helps with new \$900billion package).

- Global stocks have followed
- Bond yields off their very lows – but still low (US 10 yr at 1.10%)
- Gold off its highs
- Oil price has rebounded

### **Regulatory response to Financial Crisis**

Financial controls tightened by crises.

Response to 2008: Dodd-Frank, Basel 3, MiFID 2

No similar response in 2020 as it was not an asset bubble crisis

### **Dodd-Frank**

The Dodd–Frank Wall Street Reform and Consumer Protection Act (commonly referred to as Dodd–Frank) was signed into United States federal law by President Barack Obama on July 21, 2010.

From a financial market/investment banking perspective 2 highlights:

- Comprehensive regulation of financial markets, including **increased transparency of derivatives** (bringing them onto exchanges)
- The **Volcker Rule** - prohibits depository banks from proprietary trading

Such regulations restricted the activities and profitability of Investment Banks.

### **Trump Influence**

- On May 22nd 2018 Donald Trump signed into law an easing of such financial regulations and reducing oversight for banks with assets below \$250 Billion.
- This move from increased regulation after a crisis to deregulation during an economic boom has been a recurrent feature in the United States.
- Donald Trump targeted de-regulation by; reducing capital ratios, revisiting measures banning risky trading, reducing consumer protection.
- This led to US Bank shares outperforming other US equity sectors 2017-2019.

### **Basle 3 – International**

The Basel Committee on Banking Supervision

Goal: To steer the financial industry, and especially banks, away from the practices that led to the 2008 Financial Crisis = **Higher Capital Requirements**.



Financial institutions must set aside (safe) capital against risky activities. Capital includes cash deposits or short-term T-Bills. Risky activity might include making a 30-year loan to an institution or owning a 30-year maturity corporate bond.

Higher capital requirements

- If the capital requirement for an IB holding a 30-year corporate bond is 3% for every 100MM bonds it owns it must set aside 3MM in capital
- If capital ratios are raised to 6% for every 100MM bonds it owns it must set aside 6MM in capital
- Therefore, raising capital ratios restricts the ability of a financial institution/investment bank to do business

The accord aims to prevent banks from hurting the economy by taking more risks than they can handle. This can lead to a market liquidity problem which is exactly the problem today in Corporate Fixed Income Trading.

## **MiFID 2 – Markets in Financial Instruments Directive – EU/UK**

Implemented Jan 2018 focusing on price transparency and research unbundling

### **Price transparency**

- Making prices of securities (FX, Bonds & Derivatives) more visible to clients 'pre' and 'post' trade.
- Pre-trade transparency - trading venues and market-makers to publish offered, executable quotes before a trade is complete
- Post-trade transparency - all trades must be immediately included in a trade report. Such trade report, containing the volume and price must be published to the market. Post-trade transparency requires the timely publication of trade data to an Approved Publication Arrangement (APA).

### **Research unbundling**

The Sell Side can no longer provide research for free to the Buy Side, they must charge fees for research.

Who pays for the research? Fund manager or fund manager client? i.e. rising fees.

The way it used to work:

- The Sell Side provided research for free to the Buy Side
- The Buy Side paid the Sell Side in Trade Flow

i.e. For Deutsche Bank research, Buy Side executes multiple equity Sell orders with DB traders. But what if the best Sell / Bid price in the market was 101 or 102?

Fidelity has not provided 'Best Execution' and the end customer has been 'cheated'.

Fund managers now do more of their own research, could have been receiving research from 50 IBs pre-MiFID, now likely to be 5-15 banks.

## **Structure of FI Market & Corporate Bond Liquidity Problem**

Buy side players: Insti AM's e.g. Blackrock and PIMCO, HedgeFunds e.g. Brevan Howard, Wealth Managers e.g. UBS WM.

Sell Side players: Tier 1 IBs e.g. Morgan Stanley, Tier 2/3 banks (around 50) e.g. Lloyds bank and Standard Chartered, Sell side Brokers e.g. ICAP and BGC.

### **FI Asset Classes:**

Government bonds e.g. Gilts, US Treasuries

- Sovereigns which are issued to international clients outside the borrowers own country.
- Supranationals issues by organisation owned by the international community e.g. World Bank (US owns 7% of it).
- Agency Bonds – issued by semi-government agencies e.g. Freddie Mac.
- Corporate bonds – any bonds issued by companies.
- Emerging markets bonds – can be both government and corporate bonds.
- MBS/ABS – Mortgage and Asset backed securities which can be defined as derivatives.

Another way to classify these subsectors of FI is through rates and credit. Those that are **'rates'** basically **have no credit risk** e.g. Governments, Sovereigns, Supranationals, Agencies. (Interest rate swaps are also classified as rates). Whereas **corporates** are **defined as credit** as there is credit risk present.

Demands of the buy side:

Insti AM's: Mainly trade in governments for liquidity/ease of trading but also trade corporates.

Hedge funds – trade totally in governments for liquidity reasons (large ticket size). Don't just deal with clients, they take bets on the market e.g. if they believe Japanese government bonds are cheap relative to US Treasuries they will buy Japanese and Sell US bonds and look for movement between these 2 country bond classes. (tend to execute via telephone as no trading platform can deal with ticket size so quickly – will have several banks on the phone instead).

Wealth Managers – usually trade in corporate bonds for higher yield/return but also household names individuals will know e.g. Ford bonds.

Smaller EMEA banks trade in all FI asset classes.

### **FI Electronic trading platforms**

Tradeweb – leading platform for trading 'rates' products. (Insti AMs)

Bloomberg – good at trading all FI asset classes (WMs, smaller EMEA banks)

MarketAxess – leading corporate bond trading platform for institutional size trades.

### **Current challenge of the market**

**Liquidity** – the current extreme difficulty of executing trades in any reasonable size in the Corporate Bond Market – the Buy Side cannot transact

Accurate price information knowing where the market really is so valuable.

Problem because there are **over 400,000 unique bonds** to trade on the market (compared with only **3000 major stocks** traded and only **30 major currency pairs** in FX).

E.g. Toyota itself has shares listed on 8 stock exchanges (8 stocks) but 731 different bond issues (different coupons, maturities, currencies).

It means trying to find a buyer and a seller of the same bond at the same time in roughly the same size is very difficult. (A corporate bond problem **not a government bond problem – only around 30/40 types**). Results in 70% government bonds traded electronically versus only 30% corporates.

It is a problem now but wasn't before 2008 – Basle 3

**Factors influencing a bank's ability to hold a bond trading position:**

- IB balance sheet
- Capital requirements

Investment Bank has a risk position (long/short) in a bond it must set aside a certain amount of capital to cover that risk from a regulatory perspective e.g. Deutsche buys 10 MM Corp from client, it needs to set a 4% of capital against it.

- Pre-2008 Deutsche Bank Corporate Bond Global Balance Sheet 4 Billion USD (money available for corporate bond trading).
- Pre-2008 the Capital Requirement of any Corporate Bond was approx 4% i.e. for bank to own 10MM required USD 400,000 (that is 400,000 of 4 Billion).
- Post 2008 Deutsche Bank Corporate Bond Global Balance Sheet 1 Billion USD i.e. cut down to 25%
- Post 2008 the Capital Requirement of any Corporate Bond is approx 8% i.e. for bank to own 10MM requires USD 800,000 (that is 800,000 of 1 Billion).

With Balance Sheets down and Capital Requirements up it means **Investment Banks cannot hold bonds on their trading book anymore** – they haven't got the capital. (e.g. if someone sells them Toyota bonds, they don't want to hold it for long period of time due to capital constraint). **Leads to smaller ticket size transactions** by IBs.

It is Regulation Basle 3 that has changed the Capital Requirement Ratio.

The standard Dealer (IB) to Client trading model is broken.

The market is considering an **All-to-All model** where any market participant can trade with another e.g. buy side to buy side and sell side to sell side.

There were a multitude of new electronic initiatives proposed but there will only be 2 or 3 winners i.e. Tradeweb, Bloomberg have had to adapt to the situation.

## **Workshop Week 3**

### **Explain the corporate bond liquidity problem**

Toyota – More types of bonds compared to shares

In different currencies

Harder to find a buyer of this type of bond than a stock – may have to hold on to bond for longer as a result

When a corporate bond bought has to hold a certain amount of capital – decreasing balance sheets

Basle 3 capital requirement increase

Reduced amount of capital means IBs

There are many more corporate bonds in the world compared to common stocks. Example, Toyota has over 700 bonds outstanding compared to having its stock listed and traded in 8 places across the world. Such bonds are issued in all sorts of currencies and have been issued 10+ years ago which means that trying to find a corporate bond buyer and seller at the same time is much more difficult than it is for either government bonds or stock trading.

This means that when an investment bank buys a corporate bond off a client, they have to hold onto that bond for quite a while before they can find a buyer. When a bank owns a listed asset, it must set aside a certain amount of regulatory capital to protect itself from losses.

Since the financial crisis banks are working with much smaller balances and the capital requirements for holding corporate bonds has increased which means it is much more difficult for banks to conduct large corporate trades.

### **Major impact of MiFID 2 on financial market participants?**

Implemented Jan 2018 – 1.7M paragraphs. Huge cost with no associated revenue

Increased cost of buy side research, led to undertaking more of their own research – research unbundling

Increased price transparency – pre and post trade

led to IBs decreasing the amount of securities traded

MiFID2 is an immense piece of regulation implemented in January 2018, it includes 1.7 million paragraphs of regulation. All systems and operating systems needed to be changed. This is a huge cost to financial participants with actual revenue. So, the costs of both the buy and sell sides have increased.

Price transparency to promote fairer markets so clients receive fairer prices. Prices of bonds, shares, and derivatives will need to be disclosed tomorrow and to buying customers before and after the trade and not kept private between the client and the bank so that the client didn't know the price.

Banks used to promote significant market research on bonds, FX, micro economic analysis and accommodations. Banks provided this for free to asset managers who then conducted trades with the banks in return. Under MiFID2, Banks must charge assets managers for all research and the former will trade with the banks independent of any research relationships.

## ACF 304 – Week 4 – Central Banks

Central banks' actions affect interest rates, the amount of credit, and the money supply, all of which have direct impacts not only on financial markets but also on aggregate output and inflation.

Focusing on FED and ECB.

- The Sveriges Riksbank (oldest CB in the world) or the Bank of Sweden, was established in 1668, with its main function being lending money to the government of Sweden.
- Rising global trade increased the volume of international payments in the seventeenth century, hence the need to create more central banks throughout Europe.
- The founding of the **Bank of England (BoE) in 1694** marks the de facto origin of central banking.
- Gradually, the central banking functions evolved in order to safeguard monetary stability, which required central banks to answer to their parliaments.

To avoid the risk of power concentration, the structure of the US Federal Reserve bank, which was established in 1913, was designed to distribute power over 12 regional **Federal Reserve banks** and remained privately owned by its member banks.

Most emerging market economies established their central banks after WWII. The structure of these banks became very similar to those of European central banks.

Over the last two centuries, the functions of central banks throughout the world expanded to **regulating the value of the national currency, financing the government**, and acting as a **'lender of last resort'** to banks suffering from liquidity and/or credit crises.

The arguments **for public ownership** (government) are:

- Central banks act in the ultimate public interest.
- Private ownership bias central banks toward self-serving profit-making interests, hence increasing risk-taking and balance sheet troubles.
- The global financial crisis highlighted concerns that the profit-making target of private shareholders could hamper them from saving the financial sector during financial crises.

Supporters of **private ownership** argue that it:

- guarantees central bank independence.
- private owners would be required to recapitalise the central bank in the case of losses which lifts this burden off the fiscal budget.

Governments do get involved e.g. Trump

Variations in Functions and Structures

- There are differences in the structure and policy tools that each central bank adopts depending on the level of sophistication of the banking and financial sectors.
- Central banks have taken on increasing responsibilities which required more independence from fiscal authorities and political institutions.

## ECB

- The **European Central Bank (ECB)** came into existence on **June 1, 1998**, to handle the transitional issues of the nations that comprise the Eurozone.
- The Eurozone is an economic and monetary union consisting of the member states of the European Union (EU) that have adopted the euro as their currency.
- The creation of the Eurozone and of the new supranational institution, the ECB, was a milestone of European integration.
- All of the member states of the European Union have to comply with a set of economic and legal conditions e.g. Debt to GDP
- In January 1, 1999, 11 EU member states adopted the euro. All of the **Eurozone** or euro area countries retain their own National Central Banks (NCBs) and their own banking systems.
- Currently, the euro is the official currency of **19** out of 27 EU member countries which together constitute the Eurozone.

## **Decision making bodies**

Governing Council monetary policy fortnightly decision meeting

After meeting ECB holds a press conference to explain monetary policy decisions and rationale.

- So European Bond markets will be quiet in anticipation of the monetary policy announcement.
- It is equally important for bond markets what the ECB **'says'** at the press conference as much as what they **'do'**. Is it Hawkish or Dovish in its language? – seeking clues

## **How Monetary Policy is conducted**

The main objectives of the ECB is: maintain **price stability in the economies of the EU** (different to FED)

- As price stability is important for attaining economic growth and job creation, the ECB endeavours to **maintain its independence from governments**.
- German Bundesbank is a powerful voice within the ECB and is perhaps still haunted by the days of the Weimar Republic in 1923 (perhaps influencing the ECBs main objective).

To achieve its primary objective of price stability, the ECB aims to maintain a medium-term inflation rate closely below 2%. **Euro** area annual **inflation** was -0.3 % in **December 2020** (softening of energy prices in this figure so not too much alarm).

The ECB's operational framework consists of the following set of **conventional monetary policy instruments** (to achieve inflation target):

- **open market operations**
- standing facilities to provide and absorb overnight liquidity
- minimum or required reserve requirements for credit institutions.

The **unconventional monetary policy measures** include:

- Emergency liquidity assistance (ELA) - that provides liquidity and loans exceptionally to solvent banking and financial institutions that are facing temporary liquidity problems.
- **Quantitative easing**, where central banks buy sovereign bonds and/or other financial assets from commercial banks and financial institutions to increase money supply and stimulate the economy (banks can hoard cash instead).

The non-traditional monetary policy tools were temporary and aimed at providing liquidity to financial markets and reducing pressures on interest rates.

- Since 2014, the ECB has introduced a negative interest rate policy (NIRP) on bank deposits in order to reduce the slowdown in the economy (-0.5%).

Banks will now have to pay 0.5% interest simply for depositing much of their spare cash with it, an attempt to make them lend more to kickstart the economy.

- The ECB itself does not conduct monetary policies, but assigns these tasks to the National Central Banks e.g. QE

Example: **Explain ECB Quantitative Easing? (5 marks)**

- Unconventional monetary policy of the ECB. 1 mark
- Involves ECB purchasing of bonds from banks. 1 mark
- If a customer (ECB) buys a bond he is providing funds to bond seller. 1 mark
- Banks are then meant to lend such funds out into the economy. 1 mark
- To stimulate economic growth. 1 mark
- The ECB finished its monthly €2.5tn QE stimulus programme December 2018 but restarted QE Nov 2019 due to European/Global growth slowdown concerns. Now Covid-19 related. 1 mark

### **The FED (Federal Reserve System)**

- The Fed is an independent entity that is privately owned by its member banks.
- The Fed is subject to oversight from Congress that periodically reviews its activities.
- The Fed supervises and regulates the nation's financial institutions and simultaneously serves as their banker.

There are 12 regional Federal Reserve banks that are located in major U.S. cities.

These regional Federal Reserve banks act as the operating arm of the Fed that carry out most of its activities and implement the Fed's **dual mandate of long-term price stability and macroeconomic stability through creating jobs.**

The **Federal Open Markets Committee** holds 8 meetings a year

- It executes monetary policy for the Federal Reserve System
- It reviews economic conditions each time it meets
- It will then decide whether to use expansionary or contractionary monetary policy
- FOMC changes the Fed Funds Rate
- Even if the FOMC holds rates steady, the meeting minutes give you a high-level analysis of the US economy, press conference held after meeting too (words are immediately analysed by press/markets).

## Similarities and Differences between the ECB and the Fed

### Similarities:

- Both the ECB and the Fed are entities that bind a number of regional central banks together, (19 National Central Banks for the ECB and 12 regional Federal Reserve banks for the Fed).
- Both are **independent institutions** with a decentralized structure.
- The ECB supports political independence and makes monetary policy decisions independent of political authorities.
- The Fed is highly independent of the government and reports to Congress.

### Differences:

- The primary objective of the ECB is to achieve price stability. On the other hand, the Fed's dual mandate and monetary policy objective is to deliver price stability and support economic growth.
- The monetary operations of the Euro system e.g. QE are not centralized but conducted by the National Central Banks while **monetary operations are centralized in the Federal Reserve System**.
- The **ECB is not involved in supervision and regulation of financial institutions** as these tasks are left to the individual countries in the European Monetary Union, while the Federal Reserve is involved in these areas.

### Case for independence

1. Focus on potential inflationary biases that are likely to exert themselves as a result of political pressure to boost output in the short run i.e. before an election and reversed after an election – **no boom and bust with independence**
2. Public generally **distrusts politicians** in regard to making politically motivated decision and their lack of expertise in conducting monetary policy.
3. Politicians often opt for more central bank independence when there is disagreement between policymakers regarding unpopular macroeconomic decisions (to avoid criticism)

### Case Against Independence

- **macroeconomic stability** can be best achieved if **monetary policy is properly coordinated with fiscal policy**. As the government is responsible for the country's macroeconomic performance, it must have some control over monetary policy (alongside fiscal).

Recent trend towards greater independence – Federal Reserve has historically been more independent than most other central banks. But the structure and the level of political independence of the European Central Bank make it even more independent e.g. Senate warning Trump over attacks on FED.

### FED and Conventional Monetary Policy

#### Main tools of monetary policy:

- Reserves (set by the board of Governors)
- Open market operations
- Discount loans held by banks



Banks make loan funds to customers using deposits placed by customers. Banks only keep back small amount of cash, they rather lend out to clients.

The Fed makes one requirement – to keep a certain amount of deposits on hand to cover withdrawals i.e. **a reserve requirement**.

**Banks have an account at the Fed in which they hold deposits.** Reserves consist of deposits at the Fed plus currency that is physically held by banks.

#### Reserve Requirement Example

- A Bank has \$200MM deposits and is required to hold 10%. The Bank is allowed to lend out \$180MM and keep \$20MM as reserves at its account at the Fed.
- By increasing the reserve requirement (i.e. 15% - bank can now lend out only \$170MM) the Federal Reserve is essentially taking money out of the money supply (could be because economy is expanding too fast /inflation a threat?)
- Conversely lowering the reserve requirement increases money supply, boosting economic growth.

#### **Reserves are assets for the banks and liabilities for the Fed.**

When the Fed acts to increase reserves, it increases liquidity in the banking system (Fed can make more loans).

Reserves are divided into two categories:

- Required reserves
- Excess reserves

The Fed sets the **required reserve ratio** – the portion of deposits banks must hold at the Fed plus any cash held at bank. Any reserves **deposited with the Fed beyond this amount** are **excess reserves** (relevant to Fed funds rate).

The Fed injects reserves into the banking system in two ways:

- **Open market operations**
- Loans to banks, referred to as **discount loans**.

#### **Open Market Operations**

Conducted through primary dealers – major banks authorised to trade US Treasuries.

They can: Purchase bonds to increase the money supply or make discount loans to increase the money supply.

Naturally, the Fed can decrease the money supply by reversing these transactions.

E.g. Open Market Purchase \$100 million bonds from Primary Dealer. The size of the banking systems Balance Sheet has not changed, with total assets the same (\$100M less in securities but gained \$100M in reserves deposited at the Fed). Since these reserves can be lent out, liquidity in the banking system has increased.

**Feds balance sheet is expanded with \$100M of securities (Assets) and £\$100M of reserves (liabilities – credits primary dealers reserve account).**

Fed balance sheet has increased from \$4trillion to \$7trillion since COVID.

#### **Fed Balance sheet**

An **Open Market Purchase leads to an expansion of reserves** in the banking system because the central bank pays for bonds with reserves.

An **Open Market Sale leads to a contraction of reserves** in the banking system because the banking system pays for bonds with reserves.

## Discount lending

e.g. \$100 MM Discount Loan to First National Bank (an asset). The Fed credits \$100 MM to the bank's reserve account (liability).

- **Discount Loan** leads to an **expansion of reserves**, which can be lent out, thereby leading to an **expansion of liquidity** in banking system.
- When a **bank repays its discount loan** it reduces the total amount of discount lending, the **amount of reserves decreases** along with liquidity.

## Fed Funds Rate

Federal Funds Rate or '**Fed Funds**' – the interest rate on overnight loans on excess reserves from one bank to another (**banks with reserves over the reserve requirement states will lend to banks under the requirement**) – decided at the FOMC meeting and announced/discussed at the FOMC Press Conference, currently at 0.00-0.25% (Jan 2020 was at 1.50-1.75%, whilst average over last 40 years was 5.95%)

Fed Funds is important in the conduct of monetary policy because it affects the cost of excess reserves i.e. it influences the willingness of banks to build excess reserves and make bank lending according.

Current scenario of **low Fed funds rate encourages banks to build up excess reserves or meet requirement by increased lending and borrowing reserves at a low rate** (from own capital) to customers at a higher rate (an expansionary monetary policy).

## Market implications of Fed Funds Rate

If the Fed Funds Rate is accommodative i.e. Low

- Bank Lending/Money Supply will expand.
- The economy will grow.
- Corporate Profitability will increase.
- Share prices/the stock market will rise

Recent dovish comments about interest rate movements – stock price rise, bond prices will rise if yields staying low, although low rates are bad for \$ currency. Gold price will rally as it doesn't pay any interest.

## Conventional Monetary Policy Tools

During normal times, the Fed uses four tools of monetary policy

1. Open Market Operations
2. Discount lending
3. Reserve Requirements
4. Paying interest on Reserves

### 1. OMO

- An **open market purchase of bonds** (US Treasuries) causes the **Fed Funds rate to fall**, giving money to primary dealer therefore crediting their reserve account, **increasing the supply of money thus decreasing price**.
- An **open market sale causes the Fed Funds rate to rise** (decrease money supply, primary dealers are short of reserves so will go into market and buy reserves, increasing demand, increasing funds rate).

1. **Dynamic:** Change reserves and monetary base
2. **Defensive:** Offset factors affecting reserves e.g. If a foreign country is expected to sell its US Treasury security holdings in exchange for US dollars, the Federal Reserve may decide to buy Treasury securities in advance in order to maintain the same level of US dollars. Typically uses **REPOs**.

### REPO

- A repurchase agreement is a short-term loan (1-15 days) used in the money markets whereby the seller of the security agrees to buy it back at a specified price (which is higher than the original selling price – interest) and time.
- The seller pays an interest rate on money borrowed, called the **repo rate**, when buying back the securities.

E.g. Central Banks often use repos to boost money supply, buying Treasury bills or other government bonds from commercial banks so the bank can boost their reserves (for a short term) and then CB sells the bonds back to the banks at a later date.

When the central bank wants to tighten money supply, it sells paper (bonds) first, and buys it back later, an agreement to lend securities rather than funds.

I SELL bonds and then REPURCHASE later it is REPURCHASE agreement or REPO

If I BUY and then RE-SELL it is a REVERSE REPO

The party that is selling securities is doing a Repo, and the party that is buying securities is doing Reverse Repo.

### Advantages of Open Market Operations

1. Fed has complete control
2. Flexible and precise (for an amount of time or quantity of money)
3. Easily reversed (short term)
4. Implemented quickly (liquid money markets)

### Fed trading desk

- Staff reviews the activities of the prior day and issue forecasts of factors affecting the supply and demand for reserves.
- This information is used to determine reserve changes needed to obtain a desired fed funds rate.
- Government securities dealers (primary dealers) are contacted to better determine the condition of the market.
- A course of action is determined.
- Once the plan is approved, the desk carries out the required trades.

Trading desk typically uses two types of transactions to implement their strategy:

- **Repurchase agreements:** The Fed sells securities to the dealer (the dealer pays for securities with reserves) and the Fed agrees to repurchase them within about 15 days (dealer receiving reserves back). – in this situation Liquidity/Reserves removed
- The desired effect is reversed when the Fed has to repurchase the securities back—good for taking defence strategies that will reverse.

- **Reverse Repo** - The Fed purchases securities from the dealer (the Fed pays for securities by crediting dealer's reserve account) and the Fed sells the securities at later date – temporarily adding liquidity and reserves.

## 2. Discount Policy

The Fed's offers Discount Loans, through the **discount window**, these are:

- Primary Credit: Healthy banks
- Secondary Credit: Given to troubled banks experiencing liquidity problems.

Banks do not like to borrow from the **Discount Window for Secondary Credit** as; Higher rate than Fed Funds (It's a penal rate) and It shows your firm is in trouble. No one else will lend.

It is a **Lender of Last Resort Function** to prevent banking panics e.g. Continental Illinois bank. The unusual treatment of Continental Illinois (1984) gave popular rise to the term "too big to fail."

This can also help avoid panics e.g. Market crash in 1987 and terrorist attacks in 2001 – caused no real panic in our financial system because of Fed support.

After the Financial Crisis 2007-09 the Fed lowered the spread on the discount rate to 50 basis points, and then to 25.

But there are costs – Banks and other financial institutions may take on more risk (moral hazard) knowing the Fed will come to the rescue i.e. 'The Greenspan Put' (Fed rate dropped 6% to 1%).

## 3. Reserve Requirements

Requirements put on financial institutions to hold liquid (vault) cash against deposits they have.

Rarely used as a tool due to; Raising causes liquidity problems for banks and makes liquidity management unnecessarily difficult.

## US Fed and Non-conventional Monetary Policy Tools

The Global Financial Crisis challenged the Fed's ability to stabilize the economy:

- Financial system seized – not lending to each other (adverse selection problem).
- Zero-lower-bound problem – could not take rates below zero (as in 2008 and in 2020/21) ...hence why the Fed wished to 'normalize' interest rates 2017-2020!

The problems called for the use of nonconventional tools.

Liquidity provision

- Discount windows expansion – discount rate lowered several times.
- Term auction facility – another loan facility, offering another \$400 billion to institutions.
- New lending programs – included lending to IBs, and lending to promote purchase of asset-backed securities.

**QE – Large Scale Asset Purchases (don't need to know numbers)**

- Nov 2008 – QE1 established, purchasing \$1.25 trillion in MBS's.
- Nov 2010 – QE2, Fed purchases \$600 billion in Treasuries, lower long-term rates (driving down rates).
- Sept 2012 – QE3, Fed commits to buying \$40 billion in MBSs each month.
- (ECB had a Euro 2.5 Trillion QE programme December 2018 and modestly restarted QE again in Nov 2019. But ECB QE was later and less aggressive than Fed)

QE programs dramatically increases the Fed's balance sheet.

It is a powerful force to stimulate the economy, but perhaps also lead to inflation? (\$7 trillion for Fed).

Caused assets such as Gold to trade close to an all-time high. US Treasury Inflation Protected Securities (TIPS) was best performing asset class in 2020 rising 35% because investors fear inflation.

Question – Section B

### **How does the Federal Reserve control interest rates on Fed Funds?**

Definition of the Fed funds rate

The Federal Reserve cannot directly control interest rates on Fed Funds. **1 mark**

It can, and does, indirectly influence them by adjusting the level of reserves available to banks in the financial system. **1 mark**

The Fed can increase the amount of money in the system by buying securities, **1 mark** thus lowering demand for excess reserves and the fed funds rate. **1 mark**

Alternatively, the Fed can remove reserves by selling securities, **1 mark** and hence increase demand for excess reserves and increase the fed funds rate. **1 mark**

### **Increasing/decreasing the reserve requirements ratio?**

The Fed can increase the amount of reserves (and hence the money supply) by buying securities, **1 mark**

thus lowering the demand for excess reserves and the Fed Funds rate **1 mark**

Alternatively, the Fed can remove reserves by selling securities, **1 mark**

and then increasing demand for reserves and increase the Fed Funds rate **1 mark**

Repurchase agreements can also affect the supply and demand for reserves but on a temporary basis **1 mark**

## Seminar week 4

### Arguments for and against FOMC releasing minutes immediately after 6 weekly meeting? 5 marks

For:

Knowledge sharing

Makes Fed more accountable

Against:

Market volatility?

Keeps congress on Feds back – can achieve independent monetary policy, less subject to inflationary biases

Argument for releasing them immediately is that it makes the Fed much more accountable and increases transparency within the market i.e. the process of knowledge sharing.

Argument against releasing the FOMC meeting minutes immediately is that it keeps congress off the Fed's back thus enabling the Fed to pursue an independent monetary policy that is less subject to inflation. Due to the inflationary bias which happens with government pressure and government intervention.

### Can interest rates on bank deposits be negative? Explain the reasons for your answer. Can negative interest rates on deposits have an expansionary effect? 5 marks

Yes e.g. Europe/ECB = -0.5%

Reason for this is to encourage banks to lend more rather than keep it safe.

Increasing the money supply, encouraging households to borrow and spend more (makes credit more available). It is an extreme expansionary monetary policy tool in difficult times e.g. today/post Eurozone crisis where increasing adverse selection severely reduced lending between banks/nations

Negative interest rate should increase banks profitability as they will make more loans and earn higher interest rather than paying ECB to keep money safe with them – higher risk through lending however, increased screening needed.

But can decrease profitability as retail banks have to pay a positive rate on customer deposits but are paying the ECB to keep money with them – if worried about making loans to customers e.g. adverse selection issue.

Yes, interest rates and bank deposits can be negative. After the global financial crisis Euro of their countries. So Germany and Switzerland where the central banks charged commercial banks for holding deposits in those countries. This action is to encourage banks to lend more instead of keeping it. Since banks are willing to lend more, households will have more opportunity to borrow and spend more. Hypothetically this is what we would wish to happen. However, negative deposit rates might not always have an expansionary effect. Since commercial banks may prefer to hold cash then lend to risky clients. In addition, negative deposits rates decrease bank profits as banks still pay positive interest rates on

deposits from people, this may cause banks to lend less and therefore have a contractionary effect.

**Why might eliminating the central bank's independence lead to a more pronounced political business cycle? 5 Marks**

Not influenced by election cycle e.g. boom and bust expansionary and contractionary policy. Maintaining goal of price stability (+ full employment in US) throughout business cycle rather than 1 year before election to look favourable. Focus on long term goals e.g. no long-term large deficits.

The lack of independence of a central bank means that instead of focusing on long term public interest, the central bank decisions are grounded in a political cycle. 1 mark  
Board members are appointed based on their connections with the government instead of their high expertise and performance. 1 mark

Accordingly, they are accountable for their decisions on a short-term perspective to the current government. 1 mark Their decisions will not protect the economy against long-term large deficits. 1 mark

The expected consequence in democracies is a change of the party in charge of power. It is usually believed that increased long-term responsibilities of central banks need more independence to be successful, 1 mark but there is no evidence against it. 1 mark

Could also mention political pressures to lower interest rate just before an election, this is inflationary. Then post-election have to raise interest rates = boom and bust.

**What is a REPO?**

A repurchase agreement – short term loan used in money markets.

Involves selling securities (govt bonds) and agreeing to buy them back at a specified later date, within 1-15 days and at a specified price. The securities are bought back at a higher price than they are sold for, this additional amount (interest) is called the Repo rate.

It is a temporary tool used by CBs to increase/decrease reserves or money supply by undertaking a reverse-repo/repo.

Opposite of a repo is a reverse-repo whereby you buy the securities first and sell them back at a higher price at a later date.

## ACF 304 – Week 5 – Foreign Exchange

### **Why trade FX?**

Financial institutions generally engage in foreign exchange trading activities for the following purposes:

- The buying and selling of foreign currencies on behalf of their customers so as to **allow their customers to engage in and complete international trading transactions** with counterparties.
- The buying and selling of foreign currencies on the behalf of their customers (or on its own behalf) in order to **take positions of a speculative nature** in foreign exchange or other financial instruments.
- The buying and selling of foreign currencies for **hedging purposes** to offset customer (or its own) exposure to any given currency.

FX fluctuations matter:

- At various times US consumers have found that vacationing in Europe is expensive, due to a weakening dollar relative to the Euro.
- UK consumers pay a lot more to travel to Europe since Sterling's fall over Brexit, but UK exporters now find it easier to sell goods.
- **FTSE 100 share index is boosted as GBP falls** – companies are global so values of revenues overseas increased in sterling terms.

Trading of currencies makes up FX market

- **Spot Transactions** – involving immediate (2-day) exchange of currencies.
- **Forward Transactions** – exchange some time in future.

Currency increases in value = appreciation

Currency decreases in value = depreciation

Beginning 1999 1 EUR=\$1.18, June 16 2016 EUR=\$1.11. The Euro depreciated by 6% ( $1.11-1.18/1.18 = 0.06$ ) so USD appreciated by 6%. This affects the price of US goods in Europe and vice versa i.e. a strengthening of a currency (EUR v USD) makes foreign (US) goods cheaper in Europe BUT makes European goods more expensive in the US.

### **FX trading**

FX traded in over-the-counter market

- Involve buying / selling cash denominated in different currencies.
- Trades involve transactions in excess of \$1 million made by institutions (institutional size transactions) e.g. banks
- Typical retail consumers i.e. individuals buy foreign currencies from retail dealers, such as Western Union, American Express, high street banks.

FX volume exceeds **\$5 trillion per day** (largest market by volume of daily transactions).

**FX in the Long Run** (not heavily focused on – focus on SR)

Exchange rates are determined in markets by the interaction of supply and demand.

An important concept that drives the forces of supply and demand is the **Law of One Price**.



The Law of One Price states that the price of an identical good will be the same throughout the world, regardless of which country produces it.

E.g. American steel costs \$100 per ton, while Japanese steel costs 10,000 yen per ton.

For the Law of One Price to hold, the exchange rate between the Yen and the Dollar must be 100 yen per dollar, so that one ton of American steel sells for 10,000 Yen in Japan (the price of Japanese steel) and one ton of Japanese steel sells for \$100 in the US (the price of US steel) in the United States.

- If the exchange rate were 200 Yen to the Dollar, Japanese steel would sell for \$50 in the US or half the price of American steel, and American steel would sell for 20,000 Yen in Japan, twice the price of Japanese steel.
- Because American steel is identical to Japanese steel but would be more expensive in both countries, the demand for American steel would be zero.
- Given the fixed dollar price for American steel (\$100 per ton), the resulting excess supply of American steel would only be eliminated if the exchange rate falls to 100 yen per dollar, making the price of American steel and Japanese steel the same in both countries.

### **Purchasing Power Parity (PPP)**

The theory of **PPP states that exchange rates between two currencies will adjust to reflect changes in price levels** in those countries.

- $PPP \Rightarrow \text{Domestic price level} \uparrow 10\% \text{ (inflation)}, \text{ domestic currency} \downarrow 10\% \text{ i.e. } 10\% \text{ rise in price of Japanese Steel} = 10\% \text{ fall in Yen versus USD.}$

This is the application of law of one price to price levels. It works in long run but not in the short run.

### **Problems with PPP**

- All goods are not identical in both countries (i.e. Toyota versus Chevy).
- Many goods and services are not traded (e.g., haircuts, land).
- Assumes trade barriers are low.

Over the period 1973-2016, the rise in the British price level relative to the US price level is associated with a rise in the value of the dollar/fall in British Pound, as PPP predicts i.e. UK inflation was greater than US inflation therefore a fall in GBP.

However, the PPP relationship does not hold for shorter periods due to volatile nature of FX rate.

Trade barriers e.g. US increases the tariffs (taxes on imported goods) on French wine, so French wine becomes more expensive in US. This increase in tariffs increases demand for US wine domestically.

The USD tends to appreciate in the long run here because American wine will still sell well despite a higher value of the dollar (as tariffs make foreign imports more expensive).

Trump – tariffs on French goods over digital tax, Brazil/Argentina with steel and aluminium tariffs.

### Exchange rates in the Short Run

Interest rate importance – In the short run, it is the interest rate on domestic bank deposits in terms of foreign bank deposits that is important.

e.g. FX transactions in the US each year are 25x the amount of US imports and exports. In short-run, decisions to hold US or foreign assets have a much greater influence on FX rates than demand for exports/imports.

If non-US investors (i.e. investment manager in the UK) wants to buy US stocks they need to Sell GBP/Buy USD

If non-US Central Banks want to buy US Government Bonds – they need to Sell own currency and Buy USD to do so.

Interest rates offered to investors in any country are key for currency flows.

### **Scenario example**

- EUR bank 12-month deposit rates =2%
- US bank 12-month deposit rates =12%

As a European investor seeking returns you will:

- Sell EUR / Buy USD
- Deposit those \$ in US bank accounts to earn 12%
- EUR weakens / USD strengthens.

Weak \$ in 1980's – why it became stronger in 1990's/2000's – high interest rate.

Fall in interest rates weakened Dollar post financial crisis – specifically past couple of years.

Strengthened USD in 2018-2019 due to; Fed raising interest rates in 2018, U turn in 2019 still didn't weaken USD due to interest rates in Europe etc being even lower.

US Growth still high relative to China, Europe.

Hawkish words at FOMC press conference i.e. rising interest rates likely to result in USD rising.

When the **currency of your country appreciates** relative to another country, your country's **goods prices increase abroad**, and **foreign goods prices cheapen** in your country.

- Makes domestic **businesses less competitive**
- **Benefits domestic consumers** (you)

### FX Spot Trading

FX major players:

- Commercial Banks – for their customers
- Investment Banks – for clients and they are market makers
- Central Banks – manage own currency and smooth fluctuations, foreign government bonds
- Corporate Treasurers – global operations of MNCs e.g. BP, Shell
- Hedge Funds – bets on currencies
- Thomson Reuters/Refinitiv, EBS/ICAP – data providers
- Investment Banks Portals – customers given access

Majority traded through UK – due to time zone benefits

**Spot transactions:**

I trade today e.g. Buy USD 1,000,000 Sell EUR  
 In 2 days' time I will receive the USD and deliver EUR  
**'Trade Date' Monday – 'Value Date' Wednesday**

**Forward transactions:**

I trade today e.g. Buy USD 1,000,000 Sell EUR but request a specific settlement date in the future depending on my business needs i.e. I might have to pay a customer or supplier USD 1 MM on Nov 1st 2021, but my business is EUR based.

**Forward Trading** – to meet a future currency need

Standard settlement dates are calculated from the spot date e.g. a one-month foreign exchange forward settles one month after the spot date—i.e. if trade day is 1 February, the spot date is 3 February and the one-month forward date is 3 March.

Most traded spot FX pair is EUR/USD then USD/JPY.

**Spot quotation method****Direct – USD is the base currency**

- So if USD/JPY is 105.50/60
- That's 105.50 Yen for one Dollar

**Indirect – USD is the Quoted Currency**

- So if EUR/USD IS 1.2590/95
- 1 Euro buys 1.2590 Dollars
- Here Euro is the base currency

**USD is the base currency except for**

- EUR
- GBP (Cable)
- AUD & NZD

**Which side of the price? Am I buying or selling base currency?**

Assume for exam you are the client (the fund manager) i.e. the market taker speaking to the Market maker (IB) – always selling a currency to buy another one.

	<b>BID</b>	<b>OFFER</b>
<b>Market Taker</b>	Sells Base	Buys Base
e.g. Client/Fund Manager	1.2590	1.2595
<b>Market Maker</b>	Buys Base	Sells Base
e.g Investment Bank		

**Cross rates**

What if I don't want to sell USD/JPY or USD/Can\$ but buy Can\$/JPY = Cross Rate.  
 For unusual currency pairs where there isn't enough business for it – calculated using Bloomberg

## **FX Forwards and Swaps**

Same players as Spot rates – corporate treasurers play a more significant role.

### Forwards Outright

A Deal for any Value Date later than Spot

- Forward Outrights are mainly quoted by Banks to non-bank customers.
- Corporate clients have a large demand for Outrights in order to finance trade and to hedge their foreign currency exposure.

Forex swap involves 2 legs, near and far.

Buy near then sell far or sell near then buy far.

Two trades take place, one on the near date (first leg, usually spot), the second on the far date (second leg).

The second leg is the reverse of the first e.g. Sell USD v JPY for Spot USD 10 MM then Buy USD v JPY for 1 month's time.

Normally the Base currency amounts are identical and the Quoted currency amounts differs between the two legs

### Example

Companies may use FX Swaps to avoid foreign exchange risk.

- A British Company may own (be long) EUR from sales in Europe but operate primarily in Britain using GBP.
- However, they know that they need to pay their manufacturers in Europe in 1 month.
- They could spot sell their EUR and buy GBP to cover their expenses in Britain, and then in one-month spot buy EUR and sell GBP to pay their business partners in Europe.
- However, this exposes them to FX risk. If Britain has financial trouble and the EUR/GBP exchange rate moves against them, they may have to spend a lot more GBP to get the same amount of EUR.
- Therefore, they create a 1-month swap, where they Sell EUR and Buy GBP on spot and simultaneously buy EUR and sell GBP on a 1 month (1M) forward.
- This significantly reduces their risk. The company knows they will be able to purchase EUR reliably while still being able to use GBP currency for domestic transactions in the interim

### **Price of far leg – forward points**

ADD or SUBTRACT points from the Spot Rate

45/48 Add the points to spot – Base currency rates are lower than far leg/forward rate

-45/-43 deduct the points from spot – base currency rates are higher

E.g. if SPOT is 1.3280

The Forward/Far Leg adjustment is -45

The Forward/ Far Leg price is 1.3235

How to calculate Forward FX rate points

Forward Rates ONLY reflect interest rate differentials. There is no room for expectations.

- E.g. if US interest rates are 4% and EUR interest rates are 0%
- If you want to Buy USD/EUR would you rather have your USD now or in 12 months? You want them NOW for higher interest rate!
- To compensate you (and avoid arbitrage) if you Buy USD trade date today but value date 12 months - the exchange rate will be adjusted by 4% in your favour.

### **Broken dates**

In practice, many banks and corporates need quotes for periods intermediate between the standard run (or fixed periods i.e. not 1, 2 or 3-months' time)

They want to trade for a specific date not 12 months – e.g. 10 months and 11 days.

They use a process of **linear interpolation** to calculate the quotes e.g.  $311/360 \times 4\%$  (daily figure)

### **US Dollar Today**

DXY – US Dollar Index a measure of value of USD relative to a basket of foreign currencies, began in 1973 at 100.00.

It is a weighted measure using the Dollars movements relative to other select currencies attempting to represent their major trading partners – largest is Euro at 56%.

Investors buy USD: in times of crises, when US interest rates are relatively high.

Current climate; not in a crisis (US stocks at all time high), US interest rates are rock bottom. \$ is weak.

DXY is relatively weak – should be good for exports and make imports more expensive.

### **Q&A week 5**

US DJIA risen last week – US stimulus package

UK remained relatively flat – due to sterling appreciation

BOE Hawkish comments at committee last week – keeping rates at 0.1%

Forward guidance – not looking at negative interest rates – boosted sterling (worse for global conglomerates)

UK 250 – representative of UK economy – boosted in last week due to sterling appreciation.

This is 101-350 top companies in UK

US Non-Farm payroll – if outstrips prediction shows US rebounding well,

- More chance of inflation, more chance of higher interest rates (bond yields up/prices down) – new bonds issued will be in line with new interest rate, people will sell off old low yield bonds
- Lots of trading on back of announcement
- US stocks may go down despite stronger economy – due to being more worried about higher interest rates in future (greater returns/attractiveness of bonds over stocks plus higher cost of financing)
- USD will strengthen
- Opposite occurs if figure is much less than forecast

Look into Exchange rate MCQ's e.g. spot and future exchange rates i.e. hedging.

### **ACF 304 – Week 6 – Money Markets**

Securities in the money market are short term with high liquidity (ease to buy and sell at large quantities).

- Usually sold in large denominations (\$1MM or more - 10 MM, 20 MM or 50 MM common)
- Low default risk (as short term)
- Mature in one year or less from their issue date, although **most mature in less than 120 days**
- OTC – individual banks making bid/offers
- Active secondary market (compared to a small 200 million 20-year Can\$ Corporate Bond issued 12 years ago – harder to buy/sell)

### Cost advantages

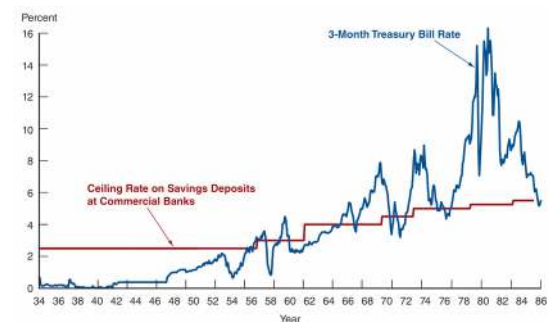
The banking industry should handle the needs for short-term as banks have an information advantage. But banks are heavily regulated which creates a distinct cost advantage for money markets over banks.

Reserve requirements create additional expense for banks that money markets do not have. Regulations on the level of interest banks could offer depositors lead to a significant growth in money markets, especially in the 1970s/1980s.

When interest rates rose, depositors moved their money from banks to money markets (as they could offer higher interest rates).

The cost structure of banks limits their competitiveness to situations where their informational advantages outweighs their regulatory costs (where moral hazard/adverse selection are present i.e. use expertise to screen customers).

Limits on interest banks could offer was not relevant until the 1950s. In the decades that followed, the problem became apparent.



### Purpose

Provides a place for Investors to warehouse surplus funds for short periods of time (safe).

Borrowers from money market source a low-cost source of temporary funds.

Corporations and U.S. government use these markets because the timing of cash inflows and outflows are not well synchronized (incurs expenses all year but only tax revenue inflows at certain points throughout the year).

Money markets provide a way to solve these cash-timing problems.

### Current money market rates

U.S. government securities					
Treasury bills (secondary market) 3 4					
4-week	0.06	0.04	0.03	0.03	0.02
3-month	0.07	0.07	0.04	0.04	0.03
6-month	0.08	0.08	0.06	0.06	0.05
1-year	0.08	0.08	0.08	0.07	0.06

Note: The prime rate (US) is the lowest rate at which money can be borrowed from commercial banks by non-banks e.g. mortgages, loans and credit cards. It typically tracks the federal funds rate and is generally about 3% higher than the Federal Fund Rate.

### Money market instruments

#### **T Bills**

- 28-day maturities through 12- month maturities.
- **Discounting:** When an investor pays less for the security than it will be worth when it matures, and the increase in price provides a return. This is common to short-term securities because they often mature before the issuer can mail out interest cheques.

Example

You pay \$999.813 for a 28-day T-bill. It is worth \$1,000 at maturity. What is its **discount rate**?

$$i_{\text{discount}} = (1,000 - 999.813) / 1,000 \times 360/28$$
$$= 0.0240 = 0.24\%$$

Note: 1) The return is computed using the face amount in the denominator (return is underestimated). And a 360-day year return is used (common in EUROBOND market)

#### **What is Investment rate?**

$$i_{yt} = (1,000 - 999.813) / 999.813 \times 365/28$$
$$= 0.00243 = 0.243\%$$

T-bills are auctioned to the dealers every Thursday.

The Treasury may accept both **competitive and noncompetitive bids**.

For competitive and noncompetitive bidders **ALL pay the highest yield / lowest price of any accepted bid**.

- Competitive bidders may/may not be allocated T-Bills
- Non-competitive bidders – you are guaranteed allocation

#### **Federal funds**

Short-term funds transferred (loaned or borrowed) between financial institutions, usually for a period of one day.

Used by banks to meet short-term needs to meet reserve requirements.

Fed funds and T bills rate track fairly closely – markets interest rates are similar as; if you want to borrow money in fed funds market but rates rise then you can borrow in T Bills market and vice versa for lending (if you want to lend in fed funds market and rate goes down you will just lend in Treasury bond market instead – they are substitutes).

#### **Repurchase agreements**

These work similar to the market for fed funds, but nonbanks can participate.

A firm sells Treasury securities but agrees to buy them back at a certain date (usually 3–14 days later) for a certain price.

This set-up makes a repo agreements essentially a short-term collateralized loan (buy securities and lend the money).

This is one market the Fed may use to conduct its monetary policy, whereby the Fed purchases/sells Treasury securities in the repo market.

### **Negotiable Certificates of Deposit**

A bank-issued security that documents a deposit and specifies the interest rate and the maturity date.

Denominations range from \$100,000 to \$10 million

### **Commercial paper**

Unsecured promissory notes, issued by corporations, that **mature in no more than 270 days** (past this have to register the instrument as a security – more regulation/costs).

The use of commercial paper increased significantly in the early 1980s because of the rising cost of bank loans.

- Commercial paper volume fell significantly during the 2008 and 2020 economic recession. Annual market is still large, at well over \$0.85 trillion outstanding.
- A special type of commercial paper, known as asset-backed commercial paper (ABCP) played a key role in the financial crisis in 2008 backed by securitized mortgages (often difficult to understand), market accounted for about \$1 trillion in size – lots of losses in 2008.
- When the poor quality of the underlying assets was exposed, a run on ABCP began. Because ABCP was held by many money market mutual funds (MMMFs), these funds also experienced a run. The government eventually had to step in to prevent the collapse of the MMMF market.

The market is essential since many foreign contracts call for payment in U.S. dollars due to the stability of the dollar, relative to other currencies.

### **Bankers acceptances**

- An order to pay a specified amount of money to the bearer on a given date.
- Bank acts as a middleman between 2 corporate clients who don't know each other.
- The bank substitutes its creditworthiness for that of the buyer (who must pay) in a trade finance transaction.

### **Eurodollars**

Eurodollars represent Dollar denominated deposits held in foreign banks.

The market is essential since many foreign contracts call for payment in U.S. dollars due to the stability of the dollar, relative to other currencies.

- The Eurodollar 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, than US banks – growth of Eurodollars in Europe especially.

Eurodollars created 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.

Although the Eurodollar market is the biggest due to the international popularity of the US Dollar for trade, any currency held outside the domestic country becomes a Eurocurrency e.g. Japanese Yen held in NY or London becomes 'Euroyen'.



- Note: This terminology / product has nothing to do with the EUR currency of Europe.
- Note: This concept is the same in the Eurobond market. e.g. \$ Eurobonds are bonds that trade outside the US. e.g. GBP Eurobonds are bonds that trade outside the UK.

London interbank bid rate (**LIBID**) – The rate paid by a bank if another bank **lends** funds.

London interbank offer rate (**LIBOR**) – The rate paid by a bank who **borrow**s funds.

Time deposits with fixed maturities (1 month, 6 months). The largest short-term security in the world.

Importance of credit worthiness for these rates – e.g. Barclays manipulated the interest rate it could borrow from other banks at to allow traders to take derivative bets on the LIBOR rate (upswing of economy). Barclays did same again in 2008 (downswing) but to make itself to look stronger than it was.

### Money market securities and their markets

Money Market Security	Issuer	Buyer	Usual Maturity	Secondary Market
Treasury bills	U.S. government	Consumers and companies	4, 13, 26, and 52 weeks	Excellent
Federal funds	Banks	Banks	1 to 7 days	None
Repurchase agreements	Businesses and banks	Businesses and banks	1 to 15 days	Good
Negotiable CDs	Large money center banks	Businesses	14 to 120 days	Good
Commercial paper	Finance companies and businesses	Businesses	1 to 270 days	Poor
Banker's acceptances	Banks	Businesses	30 to 180 days	Good
Eurodollar deposits	Non-U.S. banks	Businesses, governments, and banks	1 day to 1 year	Poor

Interest Bearing Instruments	Discount Instruments	Derivatives
Interbank Deposits	Treasury Bill, T-Bill	Forward Rate Agreement, FRA
Certificates of Deposit (CD)	Commercial Paper, CP	Interest Rate Futures
Repurchase Agreement (REPO)		Overnight Index Swaps

### Money Markets Deposits in the Foreign Exchange Market

One counterparty – the borrower – borrows a single currency from the other counterparty – the lender, at a specified rate, for a specified period of time.

- Money Markets are overnight up to and including 12 months
- Debt Market maturities are over 12 months

### Money markets in practice

Deposit market:

- A wholesale market for the borrowing and lending of money

- The period of time normally ranges from overnight up to 1 year

Short dates – ON (overnight), TN (from tomorrow to the next day – Tom Next), SN (Spot next – remember spot is 2 days away), SW (Spot to Spot Week)

Fixed dates: 1 month to 1 year

Apply to both Deposits and FX Forwards

### **Bid and Offer**

Bid – rate the bank is willing to **borrow** at

Offer – rate bank is willing to **lend** at

The client (Me) lend funds at the BID. Borrow funds at the OFFER

Loans are assets

Deposits are liabilities

Deposits – simple interest calculation

Interest =  $\frac{\text{Amount} \times \text{Rate} \times \text{No. of Days}}{\text{Day Basis} \times 100}$

### **LIBOR**

Used for fixing Loans, FRAs (forward rate agreements), Interest Rate Swaps

All major currencies

- Rates polled at 11 AM (London Time)
- Fixed by ICE
- 16 Banks Polled –Average of Mid

### **EURIBOR – Euro Interbank Offered Rate**

- Rates polled at 11 AM (Brussels Time)
- Approx 50 Banks Polled –Average of All

Note: EURIBOR can be 360 OR 365 Day Basis

## **Tutorial week 6 – watch recording to hear his answers**

### **Why would 'haircuts' on collateral increase sharply during a financial crisis?**

During a financial crisis, asset prices fall, often very rapidly and unexpectedly. **1 mark** This leads to the expectation that asset prices may fall further in the future **1 mark** and increases the uncertainty over the value of assets put up as collateral. **1 mark** as a result, firms accepting collateral assets require larger and larger haircuts, or discounts on the value of collateral in expectation of future lower values. **1 mark** This requires firms to put up increasingly more collateral for the same loans over time. **1 mark**

### **How did the structure of US Mortgage Bonds instigate the 2008 Financial Crisis? 5 marks**

- US Mortgage Bonds are known as Asset-Backed securities
- Securitised by mortgage payments from individuals homeowners.
- Subprime / low credit quality / borrowers could not afford
- AAA rated (Really? – too complex)
- Defaults
- Massive Institutional losses

US mortgage bonds are known as asset back securities, Securitised by mortgage payments by individual homeowners. Many mortgages were subprime and granted to people that could not afford them. At the same time such bonds were given a AAA rating and had complicated structures that made them hard to accurately price. As defaults happened, many bonds were worthless as house prices fell causing massive losses.

### **What is meant by the Eurodollar Market and why is it an important source of financing? 5 marks**

The Eurodollar market consists of banks that accept deposits and make loans in currencies other than those in their own country. **1 mark** The modern Eurodollar market evolved from special circumstances of the post-World War II international finance system. **1 mark** Early in this period, many foreigners found it convenient to deposit dollar balances with banks in Europe. **1 mark**

The primary reason for the expansion of the Eurodollar market is that it reduces the costs of international trade by offering traders an efficient means of economising on transaction balances in a world where most trade is denominated and transacted in U.S dollars. **1 mark** Since Eurodollar deposits are located outside the United States, **1 mark** they are not subject to reserve requirements set by the Federal Reserve. **1 mark**

Note: Regulation Q – no longer exists – existed in US, limited the interest rates that banks could pay on deposits to its customers – in order to restrict competition between banks.

To make the financial system stronger and stable

Fine when rates were low (cap was 10%), but when rates at 12% Foreign banks could offer higher rates so investors placed their money with them rather than US banks.

**Explain how the problem of asymmetric information has led to the crucial role of financial intermediaries in the financial system? 5 marks**

Asymmetric information is when one party lacks crucial information about another party, impacting decision making. We usually discuss this problem, with two avenues: adverse selection and moral hazard. Adverse selection happens before the transaction occurs, where the potential borrowers that are most likely to produce an adverse outcome, are the ones more likely to seek a loan. Moral Hazard occurs in the form of the borrower having incentives to engage in undesirable activities that make it more likely that they will not pay the loan back.

Financial intermediaries use adverse selection and moral hazard problems by applying the economies of scale and specialist results.

**Provide a concise definition of a REPO agreement. 5 marks**

Define

Interest rate called

How CBs use repo's – boost/reduce money supply through altering reserves of banks

Opposite of a repo

From slides – A repurchase agreement, or repo for short, is a short-term loan much used in the money markets. 1 mark whereby the seller of the security agrees to buy it back as a specified price and time. 1 mark

The seller pays an interest rate, called the repo rate, when buying back the securities. 1 mark

Example: Central Banks often use repos to boost money supply, buying Treasury bills or other government paper from commercial banks so the bank can boost their reserves, and selling paper back at a later date 1 mark.

When the central bank wants to tighten money supply, it sells paper first, and buys it back later 1 mark -this is called a reverse repo, an agreement to lend securities rather than funds. 1 mark

## ACF 304 – Week 7 – Risk Structure of Interest Rates and Yield Curve

### Term structure of interest rates

30-year bull market in bonds – yields dropped from 14% to 0% in 2008 and 2020 (rising price).

Low bond yields drive investors into equities.

Analysts discount future earnings using interest rates for valuations, hence lower the interest rate the higher the valuation which supports stock market.

Term structure: interest rates are structured according to maturity

### **Risk factors**

**Default risk** – occurs when the issuer of the bond is unable or unwilling to make interest payments when promised.

U.S. Treasury bonds have usually been considered to have no default risk because the federal government can always increase taxes to pay off its obligations (or just print money).

Bonds like these with no default risk are called **default-free bonds**.

But are these bonds truly **default-free bonds**? During the budget negotiations in Congress in 1995–1996, and then again in 2011–2013, the Republicans threatened to let Treasury bonds default, and this had an impact on the bond market. If these bonds were truly “default-free,” we should not have seen any reaction.

The **spread between the interest rates on bonds with default risk and default-free bonds**, called the **risk premium**, indicates how much additional interest people must earn in order to be willing to hold that risky bond.

A bond with default risk will always have a positive risk premium, and an increase in its default risk will raise the risk premium.

Increase in default risk will reduce demand for corporate bonds and increase demand for Treasury bonds. This lowers the price of corporate bonds (raising the rate) and raises the price of Treasury bonds (and lowers the interest rate), hence increasing the spread between the interest rates.

Default risk is an important component of the size of the risk premium. Because of this, bond investors would like to know as much as possible about the default probability of a bond.

One way to do this is to use the measures provided by credit-rating agencies: Moody's, Standard & Poors and Fitch are main firms.

Moody's Rating	S&P Rating	Description	Examples of Corporations with Bonds Outstanding in 2016
Aaa	AAA	Highest quality (lowest default risk)	Microsoft, J&J
Aa	AA	High quality	Apple, General Electric
A	A	Upper-medium grade	MetLife, Intel, Harley-Davidson
Baa	BBB	Medium grade	McDonalds, BofA, HP, FedEx, Southwest Airlines
Ba	BB	Lower-medium grade	Best Buy, American Airlines, Delta Airlines, United Airlines
B	B	Speculative	Netflix, Rite Aid, J.C. Penney
Caa	CCC,CC	Poor (high default risk)	Sears, Elizabeth Arden
C	D	Highly speculative	Halcon Resources, Seventy-Seven Energy

### **Example:** The Global Financial Crisis and the Baa-Treasury Spread

When the sub-prime mortgage market collapsed, questions were raised about the quality of Baa bonds, the demand for lower-credit bonds fell, and a “flight-to-quality” followed (demand for T-securities increased).

Led to the Baa-Treasury spread increased from 185 bps to 545 bps. (At the height of COVID From March-June 2019 there was a 2-3% increase).

## Liquidity Factor

a liquid asset is one that can be quickly and cheaply converted into cash if the need arises. The more liquid an asset is, the more desirable it is (higher demand), holding everything else constant.

The differences between interest rates on corporate bonds and Treasury bonds (the risk premiums) reflect not only the corporate bond's default risk but its liquidity too. This is why a risk premium is sometimes called a **risk and liquidity premium**.

**Liquidity risk** – Risk that the investor will have to sell the bond below its market value (revealed by a recent transaction or indicated on trading screens).

The primary measure of liquidity is the **size of the bid-ask spread**: difference between the ask price and the bid price (Note: European market use the term Offer not Ask)

- Ask/Offer price: price at which the dealer is willing to sell a security
- Bid price: price at which the dealer is willing to buy a security

A **liquid market** has a **small bid-ask spread** which does not increase materially for large transactions.

Marking positions to market – profit and loss of traders calculated relative to their long/short positions.

Role of investment banking risk management departments – ensure traders are marking down correct prices for the bonds they trade (can be costly e.g. Nick Leeson and Baron Brothers)

Capital constraints affects banks' ability to provide liquidity in the market e.g. Basel 3 requirements. Large ticket sizes may not be able to be bought/sold.

99% of all bonds are held by Asset Managers in Funds.

## Income Taxes Factor & Municipal Bonds (US phenomenon)

Municipal bonds tend to have a lower rate than Treasuries because Municipal Bonds (Munis) are US State issued bonds – their interest payments are tax-free to US investors unlike all other bonds e.g. A \$1000 Treasury coupon payment is taxed at 35% but a \$1000 Municipal Bond coupon payment is tax free in US.

Munis can therefore yield less than US Treasuries even though the default risk and liquidity risk is higher.

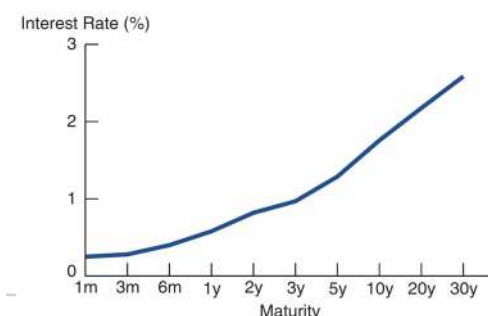
## Maturity – Term Structure of Interest Rates & The Yield Curve

Bonds with different maturities tend to have different required rates, all else equal.

The Federal Reserve directly influences short-term rates and indirectly long-term rates

Treasury issues: T-Bills (1 mth, 3 mth, 6 mth), 2 year, 5 year, 10 year, 30 year bonds.

= the yield curve: The relationship between the yield and the maturity of Treasury securities.



'Off-the-Run' Treasuries require higher yields than 'On-the-Run' (i.e. not as much demand for bespoke date bonds after their original release e.g. 4 years and 6 months bond as there is for the main standardised 'on the run' 5-year government bonds – so will have to have a higher yield to attract investors).

Theories explain why:

- Interest rates for different maturities move together.
- Yield curves tend to have steep upward slope when short rates are low and a downward slope when short rates are high.
- Yield curve is typically upward sloping.

### Pure expectations theory

Asserts that the **market sets yields based only on expectations for future interest rates**

A rising (falling i.e. inverted) term structure reflects an expectation that future short-term rates will rise (decline). If term structure is flat rates not expected to change.

e.g. the market will set the yields on a two-year bond so that the returns on the bond are equal to the return on a one-year bond plus the expected return on a one-year bond purchased one year from today.

**Shortcomings:** Assumes investors are **indifferent to interest rate risk** and any other factors associated with investing in bonds with different maturities.

It does not explain why yield curves are normally upward sloping.

**Note:** Yield curve states that investors have no preference of short-term bonds over longer term bonds.

### Market Segmentation Theory

There are different maturity sectors of the yield curve i.e. a short, medium and long maturity section. Each maturity sector is segmented (independent) from other sectors. Within **each maturity sector the interest rate is determined by the supply and demand for bonds in that maturity segment.**

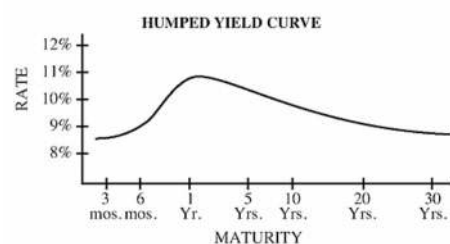
Many regulations force participants to match maturities and risks e.g. funds have criteria as to which bonds they are allowed to invest in or

Pension funds have to invest in 30-year bonds to meet their liabilities in 30 years' time.

Implication: Any shape is possible for the yield curve it just depends on the D and S for the bonds in that particularly segment.

Offers explanation of how the term structure can be

**"humped"** i.e. demand for short and long dated bonds driving yields lower but not as much demand for middle dated bonds.



**Shortcomings:** Does not explain why interest rates on different maturities move together or why yield curves tend to be upward sloping when short-term interest rates are low and to be inverted when short-term interest rates are high.

**Note:** investors have strong preference for short dated bonds relative to long term.

## Liquidity preference theory

Asserts that market participants want to be **compensated for the interest rate risk associated with holding longer-term bonds**.

The **longer the maturity, the greater the price volatility when interest rates change**. Investors demand to be compensated.

Theory states the term structure of interest rates is dependent on; **expectations about future interest rates, and a yield premium for interest rate risk**.

Upward sloping term structure – rates could be expected to rise, remain unchanged or even fall, but we **still get an upward slope due to a yield premium increasing with maturity**.

## Treasury yield curve

- Upward sloping or normal yield curve: yield increases with maturity (typical)
- Inverted: yield decreasing with maturity
- Flat: yield roughly the same regardless of maturity
- Humped: increasing then decreasing for longer maturities

## Evidence of term structure

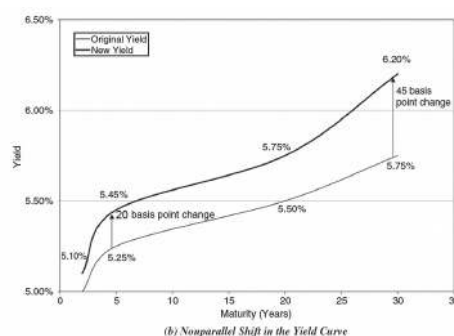
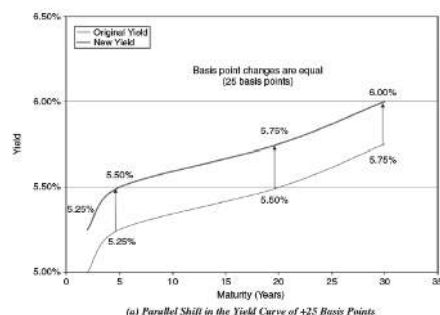
Initial research (early 1980s) found little useful information in the yield curve for predicting future interest rates.

Recently, more discriminating tests show that the yield curve has a lot of information about very short-term and long-term rates but says little about medium-term rates.

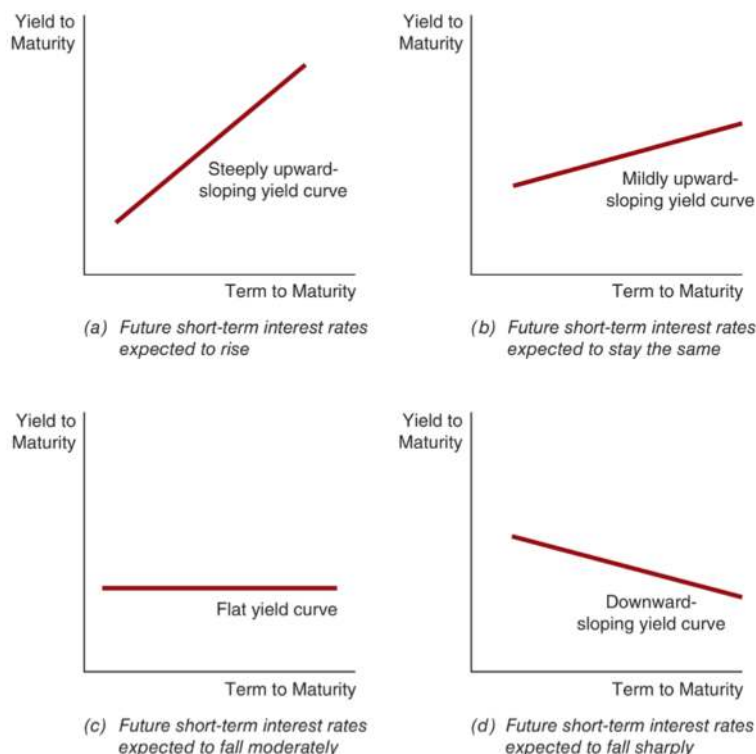
## Yield curve shifts

Parallel and non-Parallel shifts:

EXHIBIT 2 Shift in the Yield Curve



Any measure of interest rate risk that assumes that shifts in interest rates are identical for all maturities is only an approximation.





US government yield curve: 10 year - 2-year Treasury yield spread

1 year ago: 10y = 1.47%, 2y = 1.35% . Yield Spread 0.12% i.e. US Govts Yield Curve was flat/mildly upward sloping.

Today: 10y = 1.28%, 2y = 0.11%. Yield Spread 1.17% i.e. US Govts Yield Curve has steepened over the year by a large 1.05%.

What trade should I have put on if we expected this yield curve to steepen?

- Buy Short Term & Long-Term Bonds? NO
- Sell Short Term & Long-Term Bonds? NO
- Yields fell in short-term bonds – Prices risen largely
- Small fall in 10-yields – Price rise small
- Therefore, should have Bought Short-Term Bonds and sold 10-year bonds

MCQ:

Which of the following would UNLIKELY cause a widening (steepening) in the 2y-10y spread of Treasury securities?

a) Lack of appetite at the recent 10y auction

**b) Announcement of Quantitative Easing designed to purchase 10-year securities**

c) Large fund manager interest in purchasing 2-year notes

d) All of the above

Bond xx, a 5-year zero coupon bond.

Bond yy, A 20-year zero coupon bond.

You can buy or sell short both bonds.

Suppose the 5-20 year segment of the yield curve steepens.

Which of the following two strategies is most likely to be profitable?

A. Selling bond xx

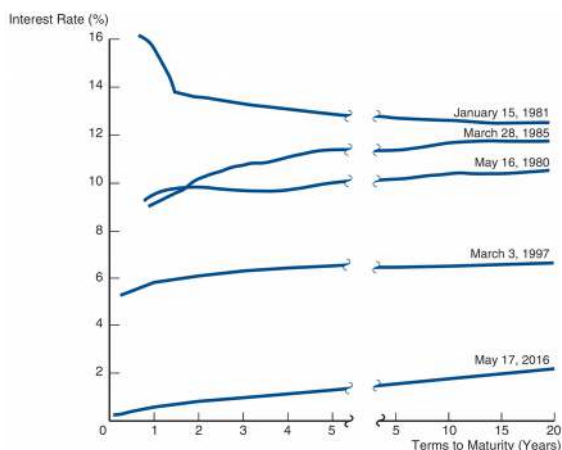
B. Buying bond xx and buying bond yy

**C. Buying bond xx and selling bond yy**

D. Buying bond yy and selling bond xx

E. Buying bond yy

### Case study: Interpreting yield curves – US government bonds



The steep downward curve in 1981 suggested that short-term rates were expected to decline in the near future. This played-out, with rates dropping by 300 bps in 3 months.

The upward curve in 1985 and 2016 suggested a modest rate increase in the near future.

The moderately upward slopes in 1980 and 1997 suggest that short term rates were not expected to rise or fall in the near term.

The upward slope in 2016 suggested short term rates in the future will rise (which they did in 2018, 4 x 0.25% Fed Funds rate increases).

**Q1)** What can we say about the overall level of interest rates between 1997 and 2016 and name the main cause of this?

Interest rates have fallen. The main cause of this was the 2007-2009 Financial Crisis.

**Q2)** What can we say about the shape of the yield curve between 1981 and 1985? What has happened to short-term and long-term interest rates?

Short-term interest rates have fallen sharply. Long-term interest rates are relatively unchanged.

**Q3)** What does an inverted yield curve mean and what does it imply about perceptions of future economic activity?

An inverted yield curve means short-term interest rates are higher than long-term interest rates. It implies future economic activity will be subdued not requiring a high interest rate regime in future.

**Q4)** As a trader, you believe the yield curve is going to invert over the next 12 months. What trade involving short-term and long-term government bonds should you put on?

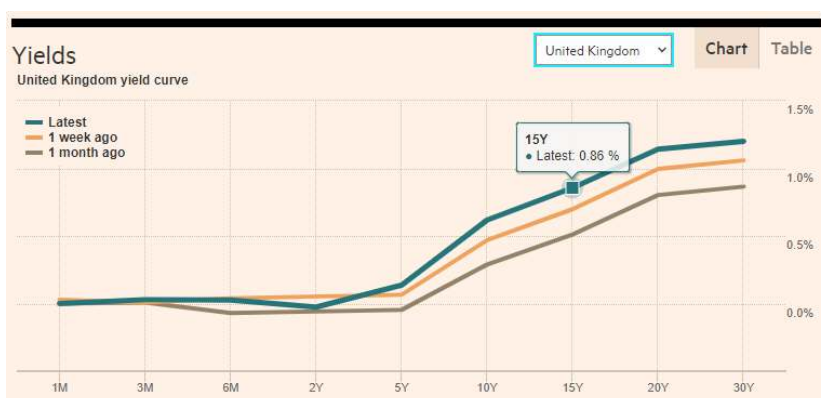
SELL short-term bonds and BUY long-term bonds

Steepening rates in the last year e.g. COVID recovery and Biden stimulus package.

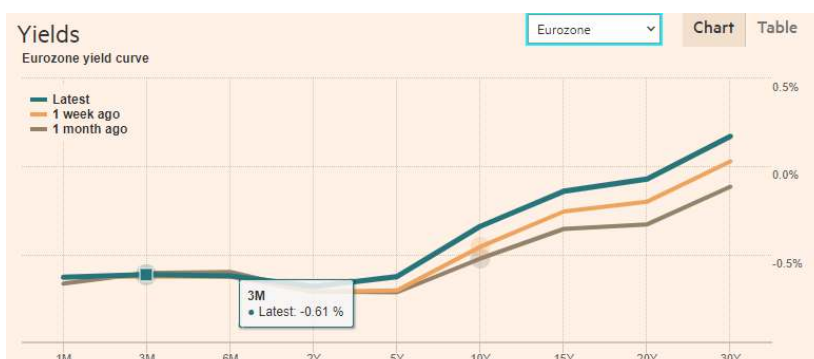
The yield curve has information about future interest rates, so it should also help forecast inflation and real output production.

- Rising (falling) rates are associated with economic booms (recessions)
- Rates are composed of both real rates and inflation expectations

## UK rates



## Eurozone rates



With Japan – negative rates on below 5-year bonds.  
10yr at just above 0%.  
20yr at 0.5%.  
30yr at 0.7%.

## Week 7 Q&A

Debt to GDP ratio question – e.g. in UK and US

UK – What is prevailing interest rate? Rates may go up

Is debt in local or foreign currency? – most likely to be Sterling otherwise liability is much greater e.g. Emerging market crises such as Turkey/Argentina issuing \$ denominated debt as investors find it attractive, but \$ strengthened following Trump measures, meaning cost of servicing debt increased largely (by a 1/3 for Turkey) – so they had to raise interest rates to protect their currency, which hurts their economy even more.

Gold price dipping despite being a hedge to inflation – current downward pressure includes:

- bond yields, 10-year Treasury risen to 1.4% since December at 0.9%.
- Stable financial system and stock market.
- Belief crisis is behind us
- Good inflation hedge are TIPS – which return 35% last year
- Last April Gold sold off at \$1500 during crisis rather than peak at all time high of \$2000+ per ounce due to a sell off to lock in profits from Gold to offset investors losses in stock in market.

Commodity and Mining stocks are at a high at the minute. Mining up 36% in the past year. Prices are high due to expectation of economic recovery.

Relative increase in bond yields – but still low compared to historic yields

Effect on stocks? – increasing cost of corporate funding, future corporate earnings are discounted using higher multiples.

At what interest rate/yield does this start causing issues?

What will inflation be in 18 months' time?

Will the Fed intervene with bond yield? – fed doesn't mind a lower stock market it is concerned about price stability and full employment, they are more concerned about liquidity and short-term interest rates than 20/30 year bond yields.

Powell testified before Senate saying inflation and employment well below Fed goals, meaning expansionary monetary policy will remain in place. Sharp rise in bond yields not seen as serious inflation concern, as inflation pressures remain muted and economic outlook still uncertain.

## Week 7 workshop

### **Explain Fixed income liquidity risk**

- Not being able to buy/sell assets in the market
- Primary measure of liquidity is the size of the bid offer spread – will be wide in illiquid market i.e. will have to sell below market value
- Corporate bonds have more liquidity risk than government bonds – there are more types of bonds, issued in different currencies, hence are more illiquid
- Size of government issue sizes much larger e.g. billions and have less types of bonds – means more supply (smaller the issue size the higher the illiquidity)
- Entry or exit of a major investor can affect liquidity
- Market conditions and the ability of a the IB to take on risk of the position will also affect liquidity. Basle 3 capital ratios and reduced bank balance sheets are relevant here.

### How does the market segmentation theory explain a humped shape yield curve?

- Different maturity bonds have different sectors/markets – they are not substitutes they are independent from other sectors
- they are priced based on the supply and demand of that particular bond – to determine their yield curve
- regulations/liabilities force investors to invest in particular bonds e.g. Insurance/pension funds go for a particular bond despite the yield due to their liabilities.
- Any shape of the yield curve is possible

### How does a flat yield curve represent a different interest outlook under the expectations theory vs. the liquidity preference theory?

- Expectation theory states the market sets the yield based only on expectations for future interest rates
- Flat yield curve in this theory represents rates not expected to change
- Liquidity preference theory states investors require a liquidity premium for longer term bonds due to their interest rate risk. It will equal the average of short term interest rates expected to occur over the life of long term bond plus liquidity premium

Flat yield curve represents rates are expected to fall in this theory (curve is flat due to the liquidity premium for longer term)

## ACF 304 – Week 8 – Bond Markets

### **Capital market**

Original maturity is greater than one year, typically for long-term financing or investments.

Capital market trading: Primary market for initial sale (IPO)

Secondary market mainly Over-the-counter with some Organised exchanges (i.e., NYSE).

Bonds are securities that represent debt owed by the issuer to the investor, and typically have specified payments on specific dates, for a fixed period of time.

They are issued by an entity that guarantees payment of original loan plus interest on a specific maturity date. The amount of interest is also known as a **coupon**.

Companies raise 10x more money from issuing bonds than shares.

**Principal** – Amount denominated in a specific currency that the issuer borrows/repays

**Coupon** – Rate of Interest

**Maturity** – Date which the bond issuer must repay the principal.

Issuers of bonds:

Central government, Government agency (e.g. Fannie Mae, Freddie Mac), Municipal government (e.g. City of Detroit), Corporate High Grade (e.g. Coca-cola), Corporate 'Junk' Bonds e.g. energy companies, Supranationals (e.g. World Bank, EIB), emerging Markets e.g. Turkey, Cemex (corporate emerging markets), Mortgage & Asset Backed Securities.

### **Preferred stock:**

- Called a 'stock' but characteristics more like a bond
- Fixed coupon (unlike equity dividends)
- Investors buy for income considerations not capital appreciation
- Ownership interest in a corporation
- Priority over common stockholders
- Credit Ranking: **Senior Bondholders – Junior Bondholders – Preferred Stock – Stock**
- Originally a US phenomenon but now developed in European Markets

Price per % of par value: Dollar price of a bond with quoted price 113 11/32 and par or nominal value \$100,000 is

$(113 + 11/32) / 100 \times \$100,000 = \$113,343.75$

Bonds can trade

At discount: below par value (below 100%)

At premium: above par value (above 100%)

Bonds trade at a discount/premium due to the coupon

Coupon: annual amount of interest

**Coupon = coupon rate x par or nominal value**

Coupons typically paid annually in Europe and semi-annually in US.

Suppose interest rates (and 10-year yields rise to 5%) and new 10-year bonds (Bond B) are issued at 100 with 5% coupon. No one will buy Bond with only a 3% coupon at 100 (Bond A) – in fact investors will sell this bond and buy Bond B paying a 5% coupon.

The price of Bond A will fall as investors sell.

It will fall to a point whereby it equals the rate of return of Bond B (5% a year).

If Bond A pays a 3% coupon each year, how can it pay an annualised return of 5% each year? By falling in price so that the coupon/interest rate plus capital appreciation equals an annual return of 5%. That price is approximately 84.5

i.e. We buy 10,000 face value. Price 84.5 (%). Cost  $10,000 \times 84.5\% = \$8,450$  which redeems at 100 (\$10,000) at maturity.

Capital gain is \$1,550 PLUS Annual Interest Rate 3% = 5% Annual Rate of Return over 10-years.

### Finding the value of coupon bonds

Bond pricing is, in theory, no different than pricing any **set of known cash flows**.

Once the cash flows have been identified, they should be discounted to time zero at an appropriate discount rate.

### Interest rate risk

- A **bond** will **trade** at a **price equal to par** when the **coupon rate is equal** to the **yield required by the market**.
- A bond will trade at a discount (price below par) when the coupon rate is below the yield required by the market.
- A bond will trade at a premium (price above par) when the coupon rate is above the yield required by the market.
- If market interest rates increase (decrease), the price of a bond will decrease (increase).

### Other terminology

**Indenture/prospectus** – the contract that accompanies a bond and specifies the terms of the loan agreement. It includes management restrictions, called **covenants**.

**Market rate/yield** – The interest rate currently in effect in the market for securities of similar risk and maturity. The market rate is used to value bonds.

**Yield to maturity** – The yield an investor will earn if the bond is purchased at the current market price and held until maturity.

### Bond instruments

**Zero coupon bond** – purchased at a discount, all interest is realised at maturity. 2-3% of bond market. Useful for private investors e.g. School fees due in 10 years times, zero coupon bond provides you with a lump sum fee at specified maturity.

### Floating rate note (FRN):

Coupon rate resets periodically (on reset dates – often every 3 or 6 months) according to a reference rate.

**Coupon rate = reference rate + quoted margin**

Example reference rate = 1-month LIBOR = 2% (The importance of LIBOR)

Quoted margin = 100 basis points = 1%

Therefore, coupon rate = 3%

**FRNs prices do not stray far from par** i.e. less volatile than non-FRNs due to resetting rate.

Treasury notes and bonds

T bills = < 1 year

Treasury note = 1-10 years

Treasury bond = 10-30 years

**Treasury Inflation-Indexed Securities:** the principal amount is tied to the current rate of inflation to protect investor purchasing power.

**Treasury STRIPS:** the coupon and principal payments are “stripped” from a T-Bond and sold as individual zero- coupon bonds.

The opposite of this process is called ‘Reconstitution’ – The process of reattaching interest payments, or coupons, that have been stripped from a Treasury bond or note.

**Example Section B Question:** What is meant by Treasury Strips and what prevents arbitrage with normal Treasury securities?

Each Treasury security has a series of separate cashflows via semi-annual coupon payments and a principal repayment.

A US Treasury dealer may purchase a Treasury security and via a separate legal entity issue a series of zero-coupon bonds against these individual cashflows creating a series of Treasury strips.

The dealer will profit from the price paid for the Treasury security and the higher prices that the Strips are sold to investors.

The opposite process called ‘reconstitution’ where individual Strips are bought and repackaged into a Treasury security prevents the value of Strips straying far from ‘fair value’.

**TIPS - Treasury Inflation-Protected Securities (TIPS):** Principal received at maturity is linked it an inflation index, higher the inflation, greater the principal repayment.

If a 10-year non-TIP US Treasury returned 4% Yield-to-maturity and the TIPS carries a 1.5% coupon on top of any inflation linked return.

Breakeven inflation rate for purchasing TIPS is 2.5%, so TIPS will outperform if inflation > 2.5% (underperform if <2.5%)

TIPS were best performing asset class in 2020 at +35% (due to fiscal stimulus leading to investors expecting inflation).

T-notes and bonds that provide inflation protection, the inflation index: CPI-U (urban consumer price index)

Coupon and principal adjusted for inflation every 6 months

Example: at t=0, real coupon rate 3.5% p.a., principal \$100,000

At t=6m, inflation 3% p.a.

Adjusted principal is:  $\$100,000 \times (1 + 0.03/2) = \$101500$  (divided it by 2 due to semi-annual coupon).

Coupon is :  $\$101500 \times 0.035/2 = \$1776.25$

Now at  $t=1y$ , inflation 2% p.a.

adjusted principal is:  $\$101500 \times (1 + 0.02/2) = \$102515$

coupon is:  $\$102515 \times 0.035/2 = \$1794.01$

### Agency Debt

Although not technically Treasury securities, agency bonds are issued by government-sponsored entities, such as GNMA (Ginnie Mae), FNMA (Fannie Mae), and FHLMC.

The debt has an “implicit” guarantee that the U.S. government will not let the debt default.

This “guarantee” was clear during the 2008 bailout of institutions.

As private companies are obliged to make profits, but government agencies are obliged to serve public.

An accident waiting to happen. After the bailout their common stock was worth 2% of a year earlier.

### Bond instruments – Corporate Bonds

Bond traders are either **credit traders** or **interest rate traders**.

Rates traders involves Governments, Sovereigns, Supranationals, covered and agencies.

Corporates is concerned with Credit.

Cannot be redeemed anytime the issuer wishes, unless a specific clause states this (call option).

Degree of risk varies with each bond, even from the same issuer. Accordingly, the required interest rate /yield varies with level of risk.

The degree of risk ranges from low-risk (AAA) to higher risk (BBB). Any bonds rated below BBB are considered sub-investment grade debt (or ‘Junk’ or ‘High Yield’).

Typically have a face value of \$1,000, although some have a face value of \$5,000 or \$10,000

**Call Provisions:** If the issuer has the right to redeem a bond early, investors require a higher yield. – callable bonds

**Convertible bonds:** Some debt may be converted to equity.

- Convertible bonds are bonds that may be exchanged for another security of the issuing firm such as common stock at the discretion of the bond holder. e.g. General Electric 3% 2030 with a conversion feature. Each bond is convertible into 10 shares of General Electric common stock at \$30 per share. Very interesting if GE shares move up to \$35 per share. Not so interesting if GE shares fall to \$10 per share.
- If the price of the underlying security/equity goes up, ‘all other things being equal’ the price of the convertible bond will also increase.
- As a result, conversion is an attractive feature to bond holders.
- It gives the bond holder an investment opportunity that is not available with nonconvertible bonds.
- It allows bondholders to gain exposure to equity investment
- As a result, the yield on a convertible bond is lower than a non-convertible bond

### Corporate bond ratings

How do they relate to corporate bond risk premium, yield and overall risk?

- In investment, a corporate bond rating represents the creditworthiness of the corporate bond. 1 mark



- The ratings are published by credit rating agencies and used by investment professionals to assess the likelihood the debt will be repaid. 1 mark
- Generally, the lower the corporate bond rating, the higher the likelihood of default and thus, the higher the bond's yield. 1 mark
- Risk premium is defined as the return in excess of the risk-free rate of return that an investment is expected to yield. 1mark
- An asset's risk premium is a form of compensation for investors to tolerate the extra risk compared to that of a risk-free investment. 1 mark
- Lower corporate bond ratings mean that the yield of the corporate bonds will be higher and causes the risk premium to increase. 1 mark

**Secured bonds** – mortgage bonds

**Unsecured bonds** (most bonds) – **senior debt, junior/subordinated debt, preferred stock.**

### **Downgrade risk**

**Creditworthiness:** Issuer's financial ability to make interest payments and repay the loan in full at maturity.

Bond ratings:

- Produced by rating agencies: Standard and Poor's (S&P), Moody's, and Fitch
- First indication of the bond's quality (creditworthiness of the issuer)
- Higher rating = less likely to experience a downgrade or default
- Even investment grade bonds may be downgraded or default

Rating agencies may:

- Lower the credit rating of a bond
- Place a bond on "credit watch" status

### **Credit Rating Agency Conflict of Interest**

March 2020 saw the fastest rate of downgrades going back to 2002. Where ratings too high before the 2020 crisis ...just like 2008?

This stems from the business model of the agencies, which are paid by the companies and governments whose creditworthiness they assess.

A rating from a top agency usually makes the sale of a bond or loan much easier

Fund managers often can only buy rated bonds and therefore have to sell bonds if they fall below certain thresholds, making the cost of financing dearer for corporates if they lose their investment grade rating.

This has led to accusations that agencies compete to win business by offering high ratings.

In 2015, S&P agreed to pay the US about \$1.4 billion to settle allegations that it boosted mortgage-backed securities in the run-up to the crisis for fear of losing market share.

Moody's paid \$864 Million. The pair account for 81% of credit ratings.

### **Electronic trading of corporates**

- **Trading of bonds electronic or via ECN (Electronic Trading Network) is most suited to Government Bonds rather than Corporates for liquidity concerns.**
- And generally, more so for stocks than bonds given 41,000 stocks in the world and millions of bonds with unique characteristics

- Of those millions of Corp Bonds many 'trade by appointment' if at all (i.e. not easily traded)
- Of the 21,175 corporate bonds outstanding in the US in 2018, only 246 traded at least once a day and a sixth did not trade at all
- Things shifted after 2008 Financial Crisis - proprietary trading desks shut down due to the Volker Rule as part of the Dodd Frank act, bond inventory most costly to carry – not helping corporate bond liquidity and e-trading
- BUT Covid-19 has accelerated the trend to Corporate Bond trading online. MarketAxess – average daily corporate bond trading climbed 29% to more than \$10bn in 2020, doubling the volume since 2017
- Tradeweb's average daily credit trading volumes trebled in 2020.
- Electronic trading accounted for 38% and 26% of overall US investment grade and junk bond trading in December 2020.
- Asset Managers predict 40% of their corporate bond trading would be electronic in 2022. Almost half of government bond trading is electronic and this is expected to grow to two-thirds by 2022.

There are limits to how far this can go – the differences between bonds and common stock are real. In other words 'liquidity attracts liquidity'

The most active corners of the (corporate) bond market will become increasingly electrified leaving a long tail of poorly a rarely traded debt.

### **Accrued interest and Duration**

Whoever owns the bond on coupon day gets the coupon e.g. Annual coupon paying bond 1st January 2018 (2019, 2020).

If our seller sells the bond on 1st July he will not get any coupon even though in theory he will have earned half the forthcoming coupon e.g. 8% coupon bond – after six months the bond will have accrued 4% worth of coupon, which is the accrued interest.

So the bond accrues interest over time. The buyer pays the accrued interest due to the seller when he buys bond (on 1st July) which he recovers on coupon date.

Using a Eurobond 360-day year and 2.75% annual coupon. Coupon payment date July 1st and 100,000 nominal.

Settlement Date of the bond 15th October has 105 days accrued.

**Accrued Interest =  $105/360 \times 0.0275 \times 100,000 = \$802.08$**

**If the price of the bond is 100 (i.e.100%) the purchaser will pay 100% of 100,000 plus \$802.08 accrued interest.**

**Bond Price is 100. The Settlement Amount is \$100,802.08**

### **Duration**

**Duration of a bond is the weighted average of the times until fixed cash flows are received.**

1) IBM 1% 2040 – Price 78 -Yield To Maturity 4%

2) IBM 6% 2040 – Price 128 -Yield To Maturity 4%

They are both 20-year bonds – do they have the same interest risk? Is maturity a good measure of exposure to interest rate risk?

No

- 1) IBM 1% 2040 receives the majority of its cash flows near maturity
- 2) IBM 6% 2040 receives significant cash flows much earlier so is less exposed to interest rate risk.

Maturity = 20 years

Duration is <19 years for both bonds.

Duration of 2) is much less than 1) and is therefore less sensitive to interest rate risk i.e.

Duration 1) may be 17 years, Duration 2) may be 11.

Example - what is the duration of a Zero-Coupon Bond with 17.2 years to maturity?

All the cash payments are on maturity, so duration is 17.2 years

### **Workshop week 8**

Principal more liquid than STRIPS and trade at a lower yield due to their liquidity.

Treasury Strips and what prevents arbitrage with normal treasuries? – answers in slides

### **Why FRN volatility is less than non-FRNs**

Define FRN

Do they have variable interest – what is it linked too? Libor. E.g. LIBOR + 1%. References a benchmark interest rate.

Non FRN are normal bonds and have fixed interest rate

FRN have a variable interest rate, the variable interest rate is linked to a benchmark interest rate such as LIBOR plus a margin e.g. LIBOR + 1%.

A shift in market yields will have a constant and significant on NON FRN FI prices reflecting the attractiveness/unattractiveness of the bonds coupon for the rest of the life of the bond if there is a big shift in market yields. This will have a small impact on FRN prices as the coupon will reset to reflect the new market yield at the coupon reset date in 1/2 months' time. So FRN bond price volatility will be very small in comparison, it is very unusual for price to fall below 99 or above 101 due to the coupon resetting in line with market yields.

## ACF week 9 – Stocks and Investment Management

**Stocks** represents ownership in a firm. Earn a return in two ways; Price of the stock rises over time, Dividends are paid to the stockholder.

Stockholders have claim on all assets

Right to vote for directors and on certain issues

Two types:

- **Common stock** – Right to vote, Receive dividends
- **Preferred stock** – Receive a fixed dividend, do not usually vote, 'Bond-like'.

### **How stocks are sold**

Organised exchanges – NYSE is best known, with daily volume around 4 billion shares, with peaks at 10 billion.

"Organised" used to imply a specific trading location. But computer systems (ECNs) have replaced this idea.

Listing requirements (>\$10 MM earnings and \$100 MM Market Value) excludes small firms.

OTC e.g. NASDAQ i.e. National Association of Securities Dealers Automated System  
Dealers stand ready to make a market

Today, about 3,000 different securities are listed on NASDAQ including technology stocks. Important market for thinly-traded / illiquid securities — securities that don't trade very often. Without a dealer ready to make a market, the equity would be difficult to trade.

### **Price Earnings valuation method**

**P/E ratio = Mkt value per share / Earnings per share**

The PE ratio is a measure of how much the market is prepared to pay for \$1 of earnings of a firm.

High PE has two interpretations:

- A higher-than-average PE may mean that the market expects earnings to rise in the future. This would return the PE to a more normal level. e.g. Netflix's PE Ratio is 150+, Amazon 100+ (last 10-year average)
- A high PE may alternatively mean that the market feels the firm's earnings are very low risk and is therefore willing to pay a premium for.

The PE ratio can be used to estimate the value of a firm's stock. The product of the PE ratio times expected earnings is the firm's stock price.  $(P/E) \times E = P$

Firms in the same industry are expected to have similar PE ratios – The value of a firm's stock can be found by multiplying the average industry PE times the expected earnings per share.

**Strengths:** Useful for valuing privately held firms and firms that do not pay dividends.

**Weakness:** Firm-specific factors are not considered.

### **Gordon Growth Model**

Stocks are valued (like bonds) as the present value of the cashflows /dividends. But we do not know what these dividends will be.

The Gordon growth model is a simplified method of computing stock value that depends on the assumption that dividends are growing at a constant rate forever (relevant and used for companies with stable growth rates in dividends per share).

The growth is assumed to be less than our required return on investing in equity.

$$P_0 = \frac{D_0(1+g)}{k_e - g}$$

where  $k_e$  = required return of an investment in equity (also noted as  $r$ )

The **main limitation** of the Gordon growth model lies in its **assumption of a constant growth in dividends per share**.

It is very rare for companies to show constant growth in their dividends due to business cycles and unexpected financial difficulties or successes.

### Stock market indices

Frequently used to monitor the behaviour of a groups of stocks.

Major indexes include the Dow Jones Industrial Average, the S&P 500, and the NASDAQ composite.

DJIA made up of older more established companies – ‘blue chip’ i.e. highest value.

Constituents chosen by Wall Street Journal and not the best indicator of US economy/stock market (S&P 500 is).

FAANGS plus Tesla account for half the value of the NASDAQ.

Buying foreign stock – American depository receipts (ADRs) allow foreign firms to trade on U.S. exchanges, facilitating their purchase. U.S. banks buy foreign shares and issue receipts against the shares in U.S. markets.

### IPOs

Lead Underwriter – The primary investment banking firm responsible for managing a security issuance

Syndicate – A group of underwriters who jointly underwrite and distribute a security issuance.

### SEC Filings

**Registration Statement** – A legal document that provides financial and other information about a company to investors prior to a security issuance.

**Preliminary Prospectus** (Red Herring) – Part of the registration statement prepared by a company prior to an IPO that is circulated to investors before the stock is offered.

**Final Prospectus** – Part of the final registration statement prepared by a company prior to an IPO that contains all the details of the offering, including the number of shares offered and the offer price.

### Valuation

Two of the ways to value a company include:

- Compute the present value of the estimated future cash flows.

- Estimate the value by examining **comparables** (recent IPOs).

Valuing using comparables

Use P/E or P/Revenue industry average, times by earnings or revenue, divide by the number of share outstanding.

### Equity Greenshoe provision

Allows the underwriter to issue more shares up to an agreed %.

If IPO successful and initial offer price met and share price rises then likely to exercise Greenshoe provision.

If unsuccessful and share price falls no need to exercise Greenshoe Provision – an IB can buy back any oversold shares in the market so supporting the price. But supporting the price can be expensive.

### Underpricing

Generally, underwriters set the issue price so that the average first-day return is positive.

Research has found that 75% of first-day returns are positive. The average first day return in the United States is 18.3%.

The underwriters benefit from the underpricing as it allows them to **manage their risk**.

The pre-IPO shareholders bear the cost of underpricing. In effect, these owners are selling stock in their firm for less than they could get in the aftermarket.

Following positive return on first day; although IPO returns are attractive, all investors cannot earn these returns.

- When an IPO goes well, the demand for the stock exceeds the supply. Thus, the allocation of shares for each investor is rationed.
- When an IPO does not go well, demand at the issue price is weak, so all initial orders are filled completely.
- Thus, the typical investor will have their investment in “good” IPOs rationed while fully investing in “bad” IPOs.

Number of IPOs is highly cyclical.

Despite surging 2019 global equity markets, the number of new listings in 2019 fell by a fifth to 1,237. The lowest level in 3 years.

The drop in IPOs comes at a critical juncture for public markets, which have shrunk over the past two decades, whilst private markets such as private equity and venture capital have expanded.

The UK’s protracted exit from the EU has placed pressure on deals in Europe with listing on the LSE falling 62% in 2019.

LSE is urging for listing rules reform for fast growth companies following Brexit impact.

### Costs of issuing an IPO

A **typical spread is 7% of the issue price**. By most standards this fee is large, especially considering the additional cost to the firm associated with underpricing.

Seems to be a lack of sensitivity of fees to issue size. One possible explanation is that by charging lower fees, an underwriter may risk signalling that its services are not the same quality as its higher-priced competitors.

Two common statistics in IPOs are **underpricing** and money left on the table (**MLOT**).

**Underpricing** is defined as percentage change between the offering price and the first day closing price.

**Money left on the table** is the difference between the first day closing price and the offering price, multiplied by the number of shares offered.  $(\text{closing price} - \text{offering price}) \times \text{no. of shares}$ .

These suggest inefficiency about the IPO process.

### Investment management – Trends and challenges

Assets under management expected to rise to \$145.4 trillion by 2025 from \$84.9 trillion in 2016.

#### **Active**

Aim to outperform a specified index/benchmark = Alpha

How? – Individual investment styles and stock selection identifying attractive/unattractive stocks using Qualitative & Quantitative tools.

Benefits

- Investment Managers make **informed decisions** on a single stock
- Active funds may significantly **outperform the benchmark**
- Flexible mandates allow movement in and out of stocks/markets
- Can provide **downside protection in bear markets**

Drawbacks

- More costly to run so **higher fees** – requires significant internal resources
- More concentrated with **fewer securities**
- Significant under-performance may occur
- Requires ability to select those active managers who can outperform

.

Tracks a specific market or section of the market by replicating the underlying index – no forecasting, stock picking or market selection

How? – **Exchange Traded Funds (ETFs)** or Index Managed Funds

Benefits

- Lower cost due to lower associated resource requirements
- Removes emotional element of gaining exposure to the underlying market
- Investors can still influence their investment portfolio through asset allocation decisions rather than individual stock picking
- Gain broad access to market sentiment

Drawbacks

- No outperformance of underlying benchmark possible
- No control of individual asset exposures – hold same weighting as benchmark
- As most indices are market capitalisation weighted passive investments tend to increase exposure to stocks that are performing well and reduce exposures to those that aren't, regardless of future outlook or valuation

- Difficult to gain exposure to illiquid asset classes e.g. hedge funds /private equity.

## ETFs

Exchange Traded Funds are a recent innovation to help keep transaction costs down while offering diversification.

- Represent a **basket of securities** – ETF is a wrapper that contains a basket of stocks, bonds or derivatives.
- **Traded on a major exchange** – bought in same way as stocks.
- Index to a specific portfolio e.g. S&P 500, so management fees are low (although commissions still apply)
- Exact content of basket is known, so valuation is certain.
- Authorized Participants create and redeem the baskets of securities keeping ETF prices aligned with market value of underlying assets e.g. When rising demand causes ETF prices to rise higher than the value of the ETF holdings the role of the AP is to buy the underlying securities, exchange them for ETF shares, and sell those shares into the market.

Large growth over last 5 years:

- ETF AUM \$7 trillion in 2019 compared to \$300 billion 2007 (+1200%).
- ETFs at 8% still only account for a fraction held in global investment funds.
- US largest marketplace. 40% of US households own ETFs v. 11% of European households.
- US ETF liquidity is largely (circa 70%) held on-exchange v 30% European

ETF market in 2003-2010 held mainly equity products but there has been product innovation from 2010-2019 e.g Credit Suisse ETF inversely linked to CBOE volatility index (VIX) i.e. gambling the VIX would stay low. Led to its value plunging 96 per cent overnight following a global markets meltdown on February 5 2019. The note's value peaked at \$2.2bn.

## Active vs. Passive

Fees – **Passive products are on average four times cheaper** than actively managed alternatives

Performance – Active Managers have a history of NOT outperforming Passive Managers.

From 2016 - 2018 the S&P 500 Price index returned 9.84% p.a. Just 19% of large-cap mutual fund managers achieved a return that exceeded their benchmark

Therefore, active managers are not justifying their higher fees hence the rise of passive investing.

Passive Funds have grown 4 times faster than Active Funds since 2007 at \$7 Trillion.

Index-tracking funds have increased their share of assets in the US by \$2 Trillion since 2013.

## Active managers responding:

Developed investment strategies and offer funds that are difficult to replicate in a passive format e.g.



- **Infrastructure, property, private equity and direct lending** (Schroders recently entered a strategic partnership with a Neos, a Dutch direct lending firm)
- Fixed Income/Asset Backed Securities i.e. complex securities.
- **Quantitative strategies**, whereby active managers run highly diversified, computer-driven portfolios that invest in a large number of stocks e.g. looking for momentum.
- **Increase the Active component** of the portfolio – only 10-15 stocks in a portfolio.

**Closet index funds** – Supposedly “active” fund managers which “hug” or stay close to their benchmark index instead of actively managing their fund.

Potentially 1 in 7 of the 2600 investment funds which ESMA (European Securities regulator) investigated may be closet indexers.

Why is this an issue?

- Misleading – investors think they are buying an actively managed fund.
- Investors could have put their money in a dedicated index tracker at a fraction of the cost.

### **Financial news w/c 8<sup>th</sup> March**

Dollar weakening – short term interest rates Fed has committed to keeping low (despite longer term bond yields rising), more concerned with unemployment and don't mind inflation overshooting 2% target.

Recent 10-year treasuries reached 1.6% due to a bad auction i.e. lack of buyers

US bond yield risen but not enough to tempt equity investors to switch i.e. S&P 500 Dividend yield still greater.

Brent crude oil at over \$60 a barrel, up from \$20 at height of Covid crisis.

Gold not at all time high: being pulled up by inflation/economic recovery. But downward pressure on gold is; we are coming out of a crisis (so selling off), plus bond yields rising making them more attractive – Gold at \$1700 per ounce.

Biden \$1.9tn fiscal stimulus package – causing predictions of stronger growth, higher interest rates and a rise in inflation.

**Non-farm payrolls added 379,000 jobs in February, over double estimates of 182,000.**

NASDAQ down 5-10% recently due to investors taking profits from the stock market highs e.g. FAANGs.

### **Week 9 Q&A session**

**Stronger NFP should lead;** to bond yields rising, Gold falling, USD up, stocks increase due to economic prospects but down due to bond yields rising (latter the answer for this course)

Went through lots of MCQs – slides on Moodle

Look into sourcing of financing, direct/indirect financing, amortizing mortgage loans.

### **Week 9 Workshop**

Cheaper PE ratio is the lower value – but depends what industry it is in.

3 regulations

Sell side – Dodd Frank (US) i.e. proprietary trading and Basle 3 i.e. meet stricter capital ratios

Sell and buy side – Mifid 2 i.e. research unbundling and price transparency.

### **ETFs**

#### **What is an ETF?**

- ❖ ETF is a wrapper that contains a basket of stocks, bonds or derivatives
- ❖ An ETF S and P 500 you are investing in the underlying securities
- ❖ Bought and sold the same way as stocks (unlike Mutual Funds which trade once a day)
- ❖ Authorized Participants create and redeem the baskets of securities keeping ETF prices aligned with market value of underlying assets

## **ACF 304 – Week 10 – Financial Derivatives & Commodities**

### **Derivatives Part 1 – Introduction & Forwards**

Starting in the 1970s, the world became a riskier place for financial institutions. Interest rate volatility increased, as did the stock and bond markets.

Financial innovation helped with the development of derivatives. They are used to manage risk, but if improperly used, can dramatically increase the risk institutions face e.g. MBS's.

### **Hedging**

Hedging involves engaging in a financial transaction that reduces or eliminates risk.

- Long position: an asset which is purchased or owned.
- Short position: an asset which must be delivered to a third party at a future date i.e. we sold the asset to a counterparty that we do not at present own.
- No position – a trader says he is 'flat'.

It involves engaging in a financial transaction that offsets a long position by taking an additional short position. Or offsets a short position by taking an additional long position.

### **Forward Markets**

Forward contracts are agreements by two parties to engage in a financial transaction at a future point in time. Although the contract can be written however the parties want, the contract usually includes:

- The exact assets to be delivered by one party, including the location of delivery.
- The price paid for the assets by the other party.
- The date when the assets and cash will be exchanged.

E.g. FX – I sell you 10 MM USD v JPY @ USD/JPY 120.40 for delivery in 3 months time.

E.g. an Interest-Rate Contract

- First National Bank agrees to deliver \$5 million in face value of 6% Treasury bonds maturing in 2032 (Treasury 6% 2032 or 6s of '32) at a price that yields the same interest rate as today's price i.e. where bond is trading today.
- Rock Solid Insurance Company agrees to pay \$5 million for the bonds.
- FNB and Rock Solid agree to complete the transaction one year from today at the FNB headquarters in town.

### **Long Position**

- Agree to buy securities at future date.
- Hedges by locking in future interest rates /yields.
- Eliminates/reduces risk of yields coming down/prices going up in the future.

### **Short Position**

- Agree to sell securities at future date.
- Hedges by locking in future interest rates /yields.
- Eliminates/Reduces risk of yields going up/prices going down in the future.

**Pros:** Flexible (date and instrument).

**Cons:** Lack of liquidity; hard to find a counterparty and thin or non-existent secondary market. Also Subject to default risk, which requires information to screen good from bad risk i.e. adverse selection.

This makes forwards of limited use in debt markets, they are much more common in FX.

### Hedging Interest Rate Risk with Forwards

First National Bank owns \$5 million of T-bonds that mature in 2037. Because these are long-term bonds, you are exposed to interest-rate risk. How do you hedge this risk?

Enter into a forward contract with Rock Solid Insurance company, where Rock Solid agrees to buy the bonds for \$5m.

- First National Bank is hedged against interest-rate increases
- Rock Solid, on the other hand, has protected itself against rate declines.

Both parties can gain or lose, since we don't know which way rates will actually go in one year. But both are better off by removing uncertainty. Good example in theory.

### Derivatives Part 2 – Financial Futures

Financial futures contracts are similar to forward contracts in that they are an agreement by two parties to engage in a financial transaction at a future point in time. But differ in several ways.

Financial futures contracts:

- Specifies delivery of type of security at future date (not a specific security).
- Arbitrage Elimination: at expiration date, price of contract = price of the underlying asset delivered.
- If rates/yields increase, long contract has loss, short contract has profit.
- Hedging similar to forwards: micro versus macro hedge
- Traded on Exchanges – global competition regulated by Commodity Futures Trading Commission

### Hedging interest rate risk

A manager has a long position in Treasury bonds. She wishes to hedge against interest rate increases, and uses T-bond futures to do this: Her portfolio is worth \$5,000,000. Futures contracts have an underlying value of \$100,000, so she must short 50 contracts.

- As interest rates increase over the next 12 months, the value of the bond portfolio drops by almost \$1,000,000.
- However, the T-bond contract also dropped almost \$1,000,000 in value, and the **short** position means the contract pays off that amount.
- Losses in the spot T-bond market are offset by gains in the T-bond futures market.

This is an example of a micro hedge – hedging the value of a specific asset.

Macro hedges involve hedging the entire value of a portfolio.

Blank	Open	High	Low	Settle	Change	Open Interest
Sept.	131.09	131.09	130.24	130.26	-0.17	2,771,629
Dec.	130.235	130.235	130.01	130.02	-0.19	3,554,632

Typical entry for the Chicago Board of Trade's \$100,000 Treasury Bonds contract on June 23, 2019, would have the following information: Normally 4 contracts a year; March, June, September, December. Makes them standardised.

Open interest – number of people that own or are short the contract. These figures are large meaning a liquid contract.

The U.S. exchanges dominated the market for years. Not true anymore:

- The London Int'l Financial Futures Exchange trades Eurodollar futures (LIFFE now known as EURONEXT)
- The Tokyo Stock Exchange trades Euroyen and government bond futures.

#### Success of Futures Over Forwards

- Futures are more liquid (open contracts): standardised contracts that can be traded.
- Delivery of range of securities reduces the chance a trader can corner the market.
- Mark to market daily: avoids default risk.
- Don't have to deliver: cash netting of positions.
- Default risk is with Clearing House not counterparty.

#### Hunt Brothers – Silver crash (cornering the market)

Early 1980s the Hunt brothers tried to corner the silver market by buying 300 million ounces of silver. The silver price rose from \$6 to \$50 an ounce.

The exchanges stepped in taking action to eliminate the corner. Silver dropped back to under \$10 an ounce. The Hunt brothers lost about \$1 billion.

#### Hedging FX risk

A manufacturer expects to be paid 10 million euros in two months for the sale of equipment in Europe. Currently, 1 euro = \$1, and the manufacturer would like to lock-in that exchange rate.

One option is doing a FX forward trade: Trade date today, value date two months, Sell EUR BUY USD.

Another option = the manufacturer can use the FX futures market to accomplish this:

- The manufacturer sells 10 million euros of futures contracts. Assuming that 1 contract is for \$125,000 in euros, the manufacturer takes as short position in 80 contracts.
- The exchange will require the manufacturer to deposit cash into a margin account. For example, the exchange may require \$2,000 per contract, or \$160,000.
- As the exchange rate fluctuates during the two months, the value of the margin account will fluctuate. If the value in the margin account falls too low, additional funds may be required by the exchange. This is how the market is **marked to market**. If additional funds are not deposited when required, the position will be closed by the exchange and you won't be allowed to trade – reduces default risk.
- Assume that actual exchange rate is 1 euro = \$0.96 at the end of the two months. The manufacturer receives the 10 million euros and exchanges them in the **spot market** for \$9,600,000.
- The manufacturer also closes the margin account, which has \$400,000 for profit in it plus any margin requirement.
- In the end, the manufacturer has the \$10,000,000 desired from the sale.

Exchange rate could have gone the other way. For example, if the actual exchange rate is 1 euro = \$1.04 at the end of the two months, the manufacturer will exchange the 10 million euros for \$10,400,000. At the same time, losses in futures market amount to \$400,000, netting the same \$10,000,000. Not as happy as didn't need to hedge.

#### Stock index futures

Financial institution managers, particularly those that manage mutual funds, pension funds, and insurance companies, also need to assess their stock market risk, the risk that occurs due to fluctuations in equity market prices e.g. NFP figures – instrument to hedge this risk is stock index futures.

Stock index futures are a contract to buy or sell a particular stock index, starting at a given level. Contracts exist for most major indexes, including the S&P 500, Dow Jones Industrials, Russell 2000.

The “best” stock futures contract to use is generally determined by the highest correlation between returns to a portfolio and returns to a particular index.

### **Hedging with Stock Index Futures**

Example: Rock Solid has a stock portfolio worth \$100 million, which tracks closely with the S&P 500. The portfolio manager fears that a decline is coming and wants to completely hedge the value of the portfolio over the next year. If the S&P is currently at 1,000, how is this accomplished?

- Value of the S&P 500 Futures Contract =  $250 \times \text{index} \Rightarrow$  currently  $250 \times 1,000 = \$250,000$
- To hedge \$100 million of stocks that moves 1 for 1 (perfect correlation) with S&P currently selling at 1000, you would: sell \$100 million of index futures = 400 contracts.

Suppose after the year, the S&P 500 is at 900 and the portfolio is worth \$90 million.

- futures position is up \$10 million (*sold 400 contracts*)

If instead, the S&P 500 is at 1100 and the portfolio is worth \$110 million.

- futures position is down \$10 million

Either way, net position is \$100 million.

Portfolio is protected from downside risk, the risk that the value in the portfolio will fall.

However, to accomplish this, the manager has also eliminated any upside potential.

If we wanted a hedging strategy that protects against downside risk, but does not sacrifice the upside we would use Options (outside module scope).

### **Derivatives Part 3 – Interest Rate Swaps**

Interest Rate Swaps involve the exchange of one set of interest payments for another set of interest payments, all denominated in the same currency.

Simplest type, called a plain vanilla swap, specifies:

- the rates being exchanged,
- type of payments,
- notional amount.

Two parties agree to exchange periodic interest payments – typically a fixed-rate (swap rate) for a floating rate, but “fixed against fixed” and “floating against floating” swaps also exist.

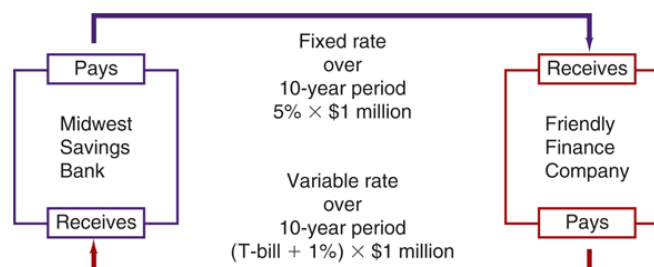
- Floating rate is based on some short-run money market reference rate e.g. LIBOR, 1-month or 3-month Treasury bill rate.
- Interest payments based on a notional principal (notional amount).
- The amount each party agrees to pay is the agreed interest rate times the notional principal.
- The only monies exchanged between the parties are the interest payments.

Purpose:

- To convert a fixed-rate asset (or liability) into a floating-rate asset (or liability) and vice versa.
- Used by companies to alter their interest rate exposures and bring them in line with management's appetite for interest rate risk e.g. a hedging instrument.
- Risk management tool for banking, corporate finance and fixed income portfolio managers

Example – Midwest Savings Bank wishes to hedge rate changes by entering into variable-rate contracts. Friendly Finance Company wishes to hedge some of its variable-rate debt with some fixed-rate debt.

- Notional principle of \$1 million
- Term of 10 years
- Midwest SB swaps 5% fixed payment for 6-month T-bill + 1% from Friendly Finance Company.



### Hedging with Interest-Rate Swaps

Reduces interest-rate risk for both parties

- Midwest converts \$1m of fixed rate assets to floating/variable rate assets.
- Friendly Finance converts \$1m of floating/variable rate assets to fixed rate assets.

They would do this to better match their interest rate assets/liabilities i.e. suppose Midwest had a lot of variable rate liabilities to match and Friendly Finance had a lot of fixed rate liabilities to match.

Advantages of swaps

- Reduces risk and no change in balance-sheet (no change in principal amount).
- Longer term than futures or options.

Disadvantages of swaps

- Lack of liquidity.
- Subject to default risk.
- Financial intermediaries help reduce disadvantages of swaps (but at a cost).

**Swap spread** – the spread that the fixed-rate payer agrees to pay above the Treasury yield with the same term to maturity as the swap.

**Swap rate = yield of a Treasury with the same maturity + swap spread**

A dealer quoting a swap rate sets the floating (variable) rate equal to the reference rate and then quotes the fixed-rate (swap rate) that will apply.

Swap spread curve – relationship between swap rate and swap maturity for a given country.

Swap spreads:

- Measure the cost of short-term borrowing over the Treasury rate.
- Are highly correlated with corresponding credit spreads.

Illustration

- Party A agrees to pay Party B periodic interest rate payments of LIBOR + 50 bps in exchange for periodic interest rate payments of 3%.
- There is no exchange of principal amounts.

- Interest payments are computed assuming a “notional” principal amount.
- Interest payments are settled in net
- e.g. if LIBOR + 50 bps in first year is 1.2% then Party A should pay B 1.2%, instead A receives 1.8% and pays B nothing – the swap rate is equal to 3% (the fixed rate).

#### Derivatives Part 4 – Credit Derivatives

Credit derivatives are a relatively new derivative offering payoffs based on changes in credit conditions along a variety of dimensions.

Credit derivatives can be generally categorized as credit options, credit swaps, credit default swaps and credit-linked notes. We focus on credit default swaps (most popular) – developed from 1990s reaching a notional outstanding of from \$61.2 trillion at end-2007 to \$9.4 trillion 10 years later.

Credit derivatives are contracts where the payoff depends on the creditworthiness of one or more companies or countries.

Credit derivatives allow companies to trade credit risk.

#### Credit Default Swap (CDS)

An insurance contract over the default of an underlying debt over a specified period of time. Most common maturities: 1-year, 3-year, 5-year, 7-year, 10-year.

Notional principal – the total face value of the underlying bonds.

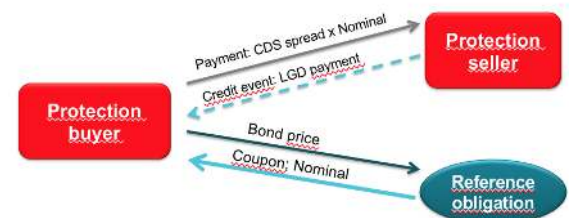
**Protection buyer** – buys a CDS contract to get protection from the default risk of a company or country.

**Protection seller** – sells a CDS contract to become exposed to the credit risk of a company or country (an insurance company).

**Payoff** – from the seller to the buyer in case of a default (or credit event) by the underlying debt.

**CDS spread/premium/rate** – total amount paid per year, as a percent of the notional principal, to buy protection.

- The premium is paid in periodic payments (typically each quarter) to the seller until the maturity of the CDS contract or until a credit event.
- The settlement in the event of default involves a cash payment from the seller to the buyer.
- Loss Given Default % (1 – Recovery Rate %): loss payment from the protection seller to the protection buyer in the credit event. When a company default often get something back (recovery rate), don't lose it all.



#### **Example of a CDS trade:**

- A bank decides to insure its exposure to the Greek Government bond and buys a 5-year Greek CDS contract on the 30th December 2010 at a CDS spread of 1021 bps and for a \$10 million notional amount.



- The protection has to pay an annual premium of  $0.1021 \times \$10\text{million} = \$1.021\text{ million}$
- Greece defaults on March 9<sup>th</sup> 2012 according to ISDA.
- On March 19<sup>th</sup>, 2012 there is a bond auction to determine the recovery rate (21.5%) and the protection buyer receives as a compensation \$7.85 million (100% less a recovery rate of 21.5%) less the accrued interest.
- Since the total net exposure of market participants who sold CDS credit protection on Greek sovereign debt was approximately \$3.18bn as of March 9<sup>th</sup>, 2012, the aggregate amount payable was approximately  $\$3.18\text{bn} \times (1 - 21.5\%) = \$2.5\text{bn}$ .

*Credit default swaps written by AIG covered more than \$440 billion in bonds (too much).*

### **Major concerns with financial derivatives**

- Derivatives allow financial institutions to increase their leverage (effectively changing their capital), possibly to take on more risk.
- Derivatives are too complicated.
- The derivative positions of some banks exceed their capital—the probability of failure has greatly increased.

Blanket comments usually not accurate – For example, although the notional amount of derivatives exceeds capital, often these are offsetting positions on behalf of clients, the bank has no exposure. Actual derivative losses by banks is small, despite a few news-worthy exceptions.

The 2007-2009 financial crisis illustrates the problem of speculative derivatives. AIG, for example, sought fee revenue from taking the short side of credit default swaps. When housing prices collapsed, they had to payout on those positions, resulting in billions in losses.

Derivatives do have their dangers but only along with other current day financial risks.

### **Commodities Part 1 – Oil**

Oil is volatile – demand growth in china early 2000s, financial crisis, civil war in Libya, COVID-19 (\$70 to \$30 a barrel – now back up to \$65 since recovery)

- OPEC stands for the Organisation of Petroleum Exporting Countries, consisting of 15 countries – led by Saudi Arabia
- OPEC's mission is to control the price of oil.
- Some major oil producers i.e. Russia, China and the United States are not members of OPEC and pursue their own agenda.
- OPEC member countries control the majority of world crude oil reserves and nearly half of natural gas reserves in the world.
- The advent of new technology, especially 'fracking' in the United States, has had a major effect on worldwide oil prices and lessened OPEC's influence on the oil market (In November 2019, the United States became a net exporter of all oil products and is the world's single largest oil producer (19% of global output).

OPEC began capping supply with Russia and several other countries in 2017 - 2020 to force up the price of oil after a price fall. It has been a volatile relationship but there is a current production cap agreement in place now.

Brent Crude is the international benchmark for oil prices (accounting for 2/3 of world oil).

West Texas Intermediate (WTI) is the US pricing benchmark (accounts for 1/3 world oil).

#### **April 2020**

- Global demand is down about one third.
- Brent dropped below \$20 p.b. for the first time in 18 years (following drop in demand and Russia/Saudi price war).
- WTI fell with a severe drop in demand coinciding with levels of US production remaining robust despite storage tanks being just weeks away from reaching capacity.
- Futures Contracts for the US benchmark West Texas Intermediate for delivery next month (Futures CME) tumbled to minus \$40 per barrel. First time in negative territory (only for May futures due to immediate storage issue).
- Brent Crude – the international benchmark – is better insulated as it is seaborne, making storage less of an issue as long as traders can charter oil tankers.

#### **Commodities Part 2 – Gold**

- Gold is regarded as a 'safe haven' investment. It has been around for 5000 years as a medium of investment (will be around for another 5000 years, that's the attraction).
- Gold does not pay any interest nor have obvious capabilities for capital appreciation however, investors buy gold when financial markets are falling or if there is a strain on the financial system.
- At the height of the 2008 Financial Crisis, when demand for gold was strongest, the price of gold reached over \$1,900 per ounce.
- In the height of the 2020 Covid-19 financial crisis gold reached \$2,050 per ounce.

#### **Gold and USD – an inverse price relationship**

- Gold price has an inverse relation with the dollar i.e. when the Dollar strengthens, all other things being equal, the price of gold will fall. When the Dollar weakens, the price of gold will rise.
- Because a bar of gold has intrinsic value it is worth a 'bar of gold'.
- If USD strengthens by 10% then for anyone buying gold using a non-dollar currency the price of gold will cost you 10% more.
- But if nothing has changed around the fundamental attractiveness/unattractiveness of holding gold it is not worth 10% more so the price of gold would fall by 10% (in theory) so that its value remains the same as before.

In COVID-19 crisis gold did not originally act as a safe-haven asset in March 2020 (below \$1500 an ounce – investors cashing in profits on gold to offset huge losses on equities). Then by May – July its safe haven fundamental reasserted themselves up to \$2000 per ounce.

In 2021 Gold prices have been down (around \$1700 per ounce); the world is not in a financial crisis anymore, and higher bond yields reduce gold's attractiveness (Biden package)

#### **Seminar week 10**

Biden package passed , yields up to 1.69%

US corporate bond yields – at 4.5% at COVID crisis peak, has dropped to 2% since but now starting to tick up again. Impacting cost of borrowing (bond issuance)

Interest rate swaps – OTC derivatives allow market participants to closely offset the risks they face and to ensure certainty in financial performance. For example pension funds use derivatives to hedge inflation and interest rate risk in long dated pension liabilities. Governments use derivatives to reduce interest rate risk on new bond issuance.

- The need for customised risk management tools remains important (to meet regulatory framework)
- IRS are highly customisable.
- Tenor 3 months to 40 years

### **Gold as a means of investment** (Section B – 5 marks)

Safe haven asset – people buy in times of crisis

Buy in times of inflation – a hedge. It keeps its value in an inflationary environment.

Inverse relationship to USD due to being priced in USD and it has intrinsic value. If USD goes up then Gold price goes down. If USD strengthens by 10% then for anyone buying gold using a non-dollar currency the price of gold will cost you 10% more. But if nothing has changed around the fundamental attractiveness/unattractiveness of holding gold it is not worth 10% more so the price of gold would fall by 10% (in theory) so that its value remains the same as before.

### **Explain the main influences on the price of oil** (section B – 5 marks)

What is oil, how it priced (\$ per barrel), major producers and their current agreement, interesting price implications e.g. supply and demand, COVID-19, negative WTI, fracking, geo-politics.

Oil got a more physical deliver factor than gold (can sell the oil you own otherwise have to store it), also too many factors influencing price of oil e.g. politics, fracking so gold a greater commodity for hedging inflation.