How to Save and Invest

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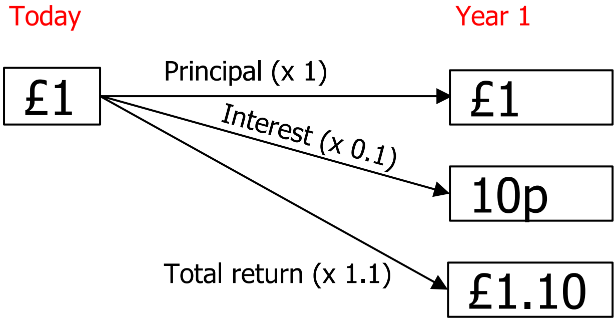
Overview

- How to save
  - Compound interest on a bank account
  - Inflation and tax
- How to invest
  - Government bonds, corporate bonds, shares, mutual funds
  - The different sources of return: interest, dividends, capital gains
  - The risk of investing, and what happens in a bankruptcy
  - Tax - and how to invest tax-free
  - Pensions: see Lecture 2

I: How to Save

How to Save

- Saving is depositing your money to the bank - “renting” it out
  - *Principal* is what you originally invested
  - *Interest* is the rent the bank pays you
- Consider principal of £1 and interest of 10%, i.e. 0.1



Compound Interest

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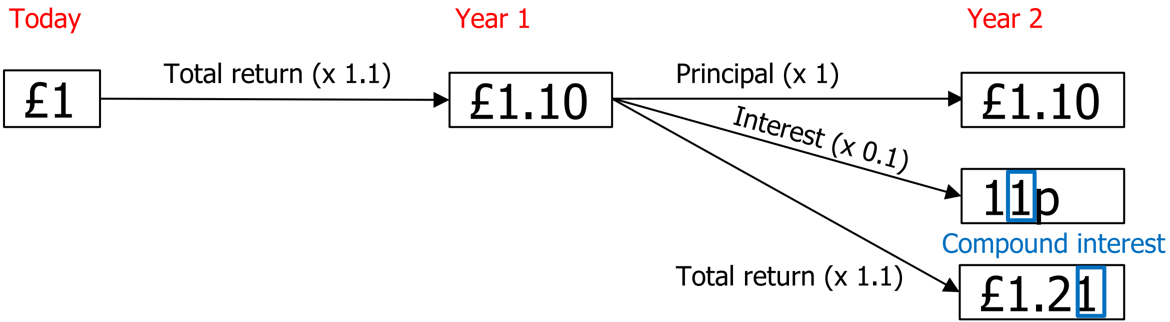


Compound Interest: The General Case

Today | Year 1 | Year 2 | Year T

$$\pounds 1 \xrightarrow{\times 1.1} \pounds 1.10 \xrightarrow{\times 1.1} \pounds 1.21 \text{ ------ } \pounds 1.1^T$$

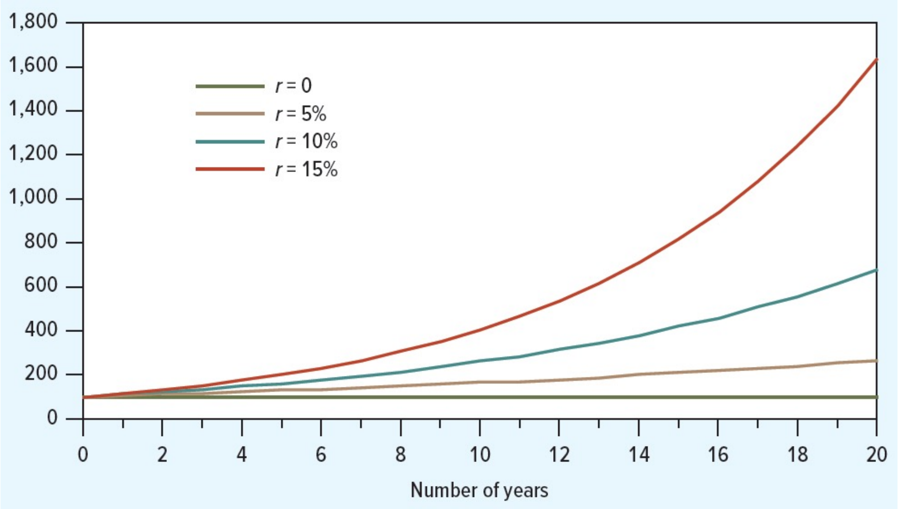
$\pounds 1 \to \pounds 1.21$: x 1.1^2 NOT x 1.2

$\pounds 1 \to \pounds 1.1^T$: x 1.1^T

$$\pounds C \xrightarrow{\times (1+r)^T} \pounds C(1+r)^T$$

$$\pounds 5k \xrightarrow{\times (1.08)^6} \pounds 7{,}934$$

The Power of Compounding



The Effect of Inflation

- Suppose all you eat is apples, which cost £1 each today, and that r = 26%. Can you buy 26% more apples next year?
  - It depends on the price of apples next year. Assume it grows to £1.05

	Today
Money	£100
Price of apples	£1
Number of apples	£100 / £1 = 100

The Effect of Inflation

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	Today	**Year 1**
Money	£100	£126
Price of apples	£1	£1.05
Number of apples	£100 / £1 = 100	£126 / £1.05 = 120

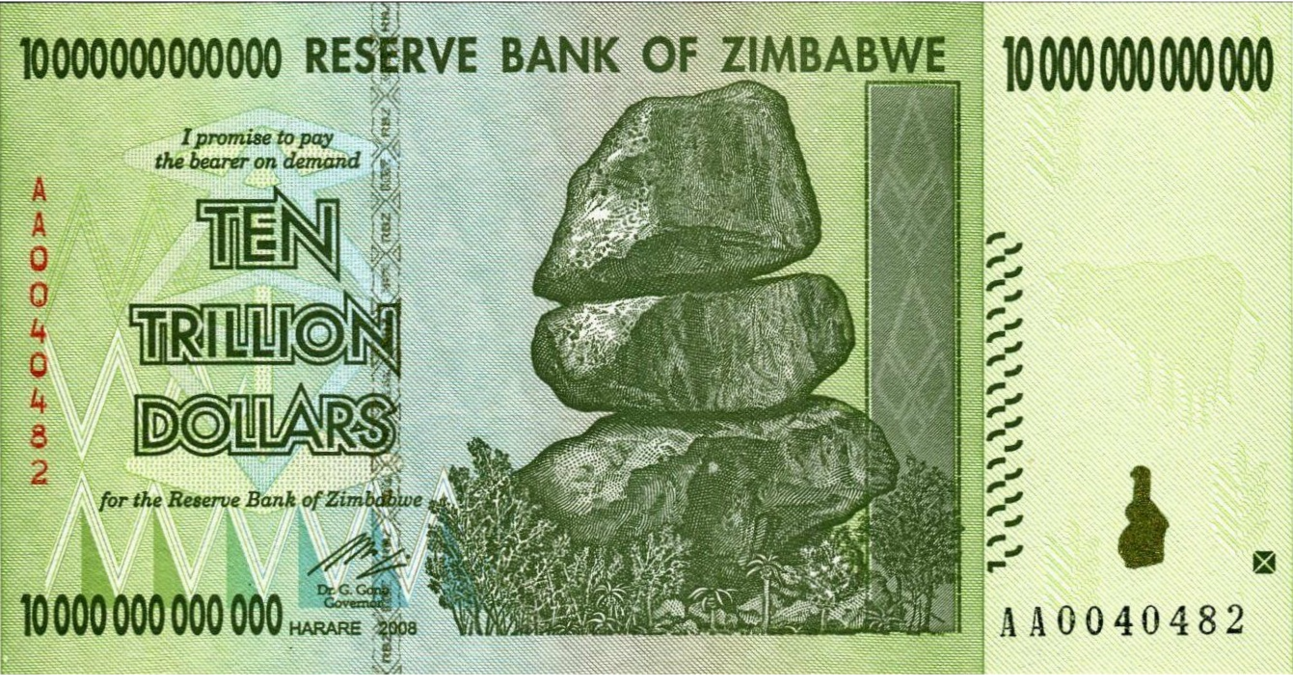
- You are only 20% better off, not 26%. Your *real rate of return* is 20%

The Effect of Inflation: General Case

- The *nominal rate of return* is r (26% in the last example)
- The *inflation rate* is i (5% in the last example)
- What is the *real rate of return* R?

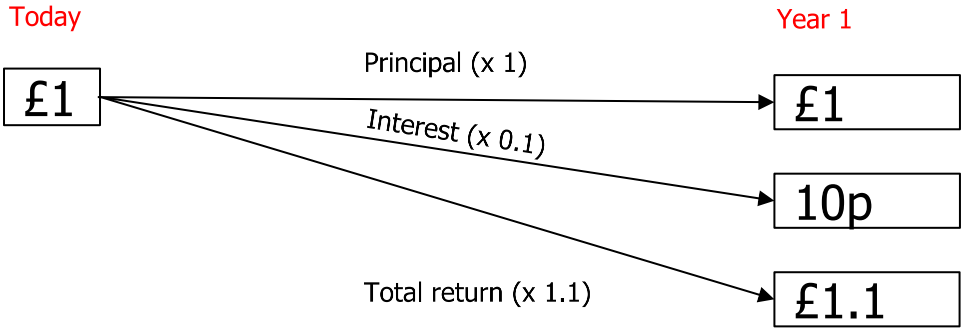
- 1+R = $\frac{1+r}{1+i}$

- 1+R = $\frac{1.26}{1.05}$ $\longrightarrow$ R = 0.2 = 20%
- *Not* R = 26% - 5% = 21%


10000000000000 RESERVE BANK OF ZIMBABWE
10 000 000 000 000
I promise to pay the bearer on demand
TEN TRILLION DOLLARS
AA0040482
for the Reserve Bank of Zimbabwe
Dr. G. Gono
Governor
10 000 000 000 000
HARARE 2008
AA0040482

The Effect of Taxes

- Interest is income, and so is taxed at the income tax rate 20%
- The repayment of principal is not income, and so is not taxed



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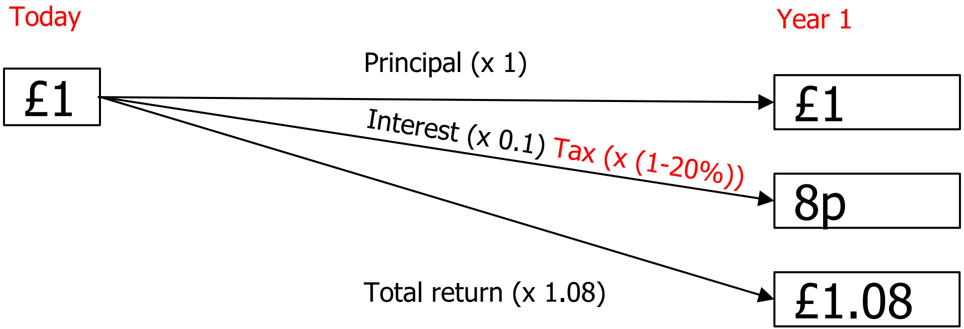

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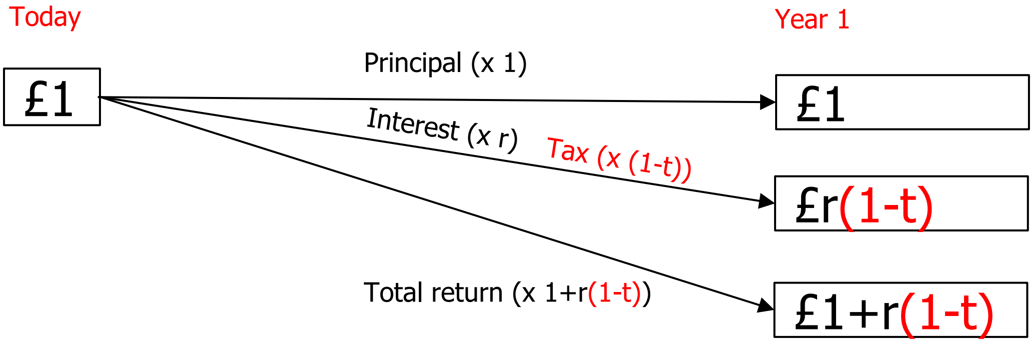


Tax Treatment in the UK

- Banks pay interest *gross* (without deducting tax), from April 2016
- Personal Savings Allowance
  - Basic (20%) taxpayers may earn £1,000 of interest tax-free
  - Higher rate (40%) taxpayers may earn £500 of interest tax-free
  - Additional rate (45%) taxpayers have no PSA
- If you earn less than the Personal Allowance (currently £12,570) for non-savings income, you're a non-taxpayer
  - You benefit from the Starting Rate for Savings: you may earn £5,000 of interest tax-free. Reduced £1 for every £1 you earn above the Personal Allowance
- You have to declare your interest income in your tax return, and pay tax on any income above the PSA

II: How to Invest: Bonds

Bonds

- A *bond* is "renting" out your money to the government (*government bond* or *gilt*) or a company (*corporate bond*)
- Bonds pay interest (known as a *coupon*) and repay the principal (also known as *par value* or *face value*)
  - E.g. 3% Treasury Stock 2030; Tesco plc 4% 2025
- Differences with cash:
  - You can withdraw cash at any time, but you can't withdraw a bond. You only get your principal back at the *maturity date*
  - You buy or sell bonds second-hand. The price of the bond may be different from the principal, so you may make *capital gains or losses*
    - Capital gain = Sale price – Purchase price

Bond Yield

- The *yield* of a bond is the total return, taking into account both coupons and capital gains
- A Tesco 4% bond (paid annually) has a principal of £100 and matures 1 year from now. Its price is £99; what is its yield?
  - The coupon is paid on principal, not price. Next year you receive a coupon of £4 and are repaid the principal of £100, for a total return of £104
  - Yield is £104 / £99 – 1 = 5.05%
  - Does this make sense? Yes: you get the coupon of 4% *and* a capital gain
  - For a *discount bond* where price < principal, yield > coupon rate

Prices and Yields

- A Tesco 4% bond (paid annually) has a principal of £100 and matures 1 year from now. If its price is £99, yield is £104 / £99 – 1 = 5.05%
  - For a *discount bond* where price < principal, yield > coupon rate
- If its price is £101, yield is £104 / £101 – 1 = 2.97%
  - Does this make sense? Yes: you get the coupon of 4% *but* a capital loss
  - For a *premium bond* where price > principal, yield < coupon rate
- If its price is £100, yield is £104 / £101 – 1 = 4%
  - For a *par bond* where price = principal, yield = coupon rate

III: How to Invest: Stocks and Shares

Stocks and Shares

- Stocks and shares are the same thing – a *share* in the ownership of a company

- For 225.7p, you can buy 1/7.73bn of Tesco on the *stock market*
- To own Tesco, you'd need to buy all 7.73bn *shares outstanding*
- The *market capitalisation* or *market value* of Tesco is 225.7p × 7.73bn = £17.45bn

What Shares Entitle You To

- Every year, Tesco earns *profits*. These profits are either
  - Retained or reinvested within Tesco
  - Paid out to shareholders as *dividends*
- One share of Tesco entitles you to 1/7.73bn of all future dividends
  - Last year, this was 10p **Annual div** (ADY) 10.00
  - No maturity date
- One share currently costs 225.7p because the market thinks 1/7.73bn of future dividends is worth 225.7p (see Lecture 5)
  - If the economy improves, people will expect Tesco to pay higher dividends, so the share price will rise
  - You can sell your shares at any time (rather than waiting to collect the future dividends) and realise a *capital gain or loss*
- One share also entitles you to one vote, e.g. in director elections

What Happens in Bankruptcy

- Debtholders (e.g. bondholders / bank) are senior and paid first
  - Shareholders are junior and only paid after debtholders have been paid in full
  - If debtholders aren't fully paid, company is *bankrupt* and control passes to them
  - Shareholders have *limited liability* – they don't need to make debtholders "whole"
- Assume debt has face value of £100 and no coupon

Total	**20**	**70**	**100**	**200**	**10,000**
Debt	20	70	100	100	100
Equity	0	0	0	100	9,900

Taxation of Dividends in the UK

- You can earn up to £2,000 in dividends tax-free. Above this amount:
  - Basic (20%) taxpayers pay 7.5%
  - Higher rate (40%) taxpayers pay 32.5%
  - Additional rate (45%) taxpayers pay 38.1%
- Any "spare" personal allowance (income below £12,570) can be applied to dividends
  - If you earn £10,000, you can receive £2,570 + £2,000 = £4,570 of dividends tax-free

Taxation of Capital Gains in the UK

- You only pay CGT when you sell shares, not when prices change
- You have a tax-free allowance of £12,300. Above this amount:
  - Basic (20%) taxpayers pay 10%
  - Higher (40%) and additional (45%) rate taxpayers pay 20%
  - If you don't use the allowance, you lose it. So, you should generally realise as many capital gains as possible without exceeding the allowance
- Any losses can be offset against capital gains
  - E.g. if gain of £15,000 on share A and loss of £3,000 on share B $\longrightarrow$ net gain of £12,000, so no CGT to pay

Mutual Funds

- Be very careful about trading shares – you're against professionals
  - See Gresham lecture on "The Mistakes Investors Make"
  - You also don't get the benefit of diversification (see Lecture 5). Best-performing 4% of stocks explain entire US stock market gains since 1926[1]
- Same is true for Bitcoin, second homes etc.
  - "Get rich slowly, but get rich"
- Mutual funds hold many shares in return for an annual fee
  - Passive, active

1. Bessembinder (2018)

Mutual Fund Themes

- Size
  - T. Rowe Price US Large-Cap Growth Equity
  - Schroder US Smaller Companies
- Industry
  - Pictet Clean Energy
  - First Trust Cloud Computing
- Region
  - Jupiter India
  - Polar Capital European ex-UK
- Asset Class
  - Janus Henderson Global Properties
  - Wisdom Tree Broad Commodities

Individual Savings Account (ISA)

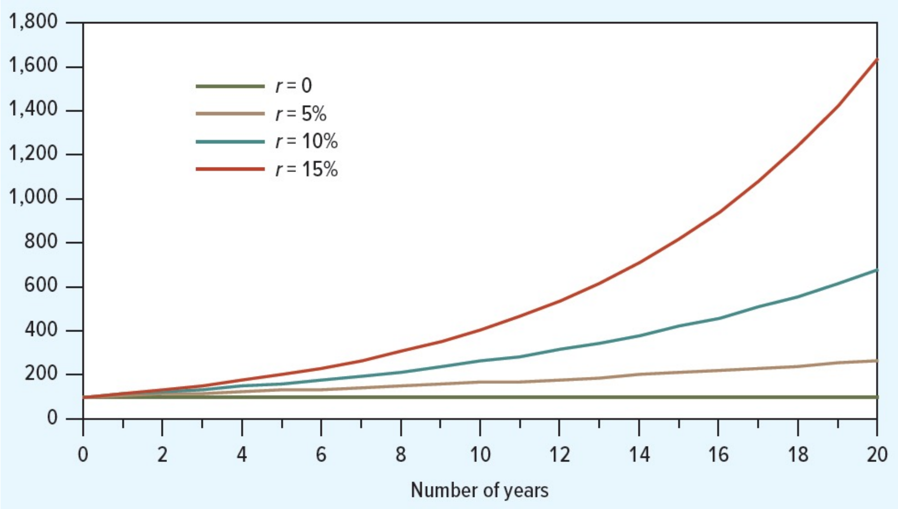
- You can invest £20,000/year free of all taxes (income and CGT), across:
    - Cash ISA
        - When it matures, you can transfer it to another ISA without using up this year's allowance
    - Stocks and Shares ISA (individual shares and mutual funds)
    - Lifetime ISA: must be under 40 to open. Can pay in £4,000/year until age 50. Government adds 25% bonus
        - Can only withdraw when buying first home, aged 60 or over, or terminally ill
- ISAs can be held through different providers
    - E.g. Cash ISA with a bank (NatWest, Barclays); Stocks and Shares ISA with a broker (Hargreaves Lansdown, AJ Bell)
- Junior ISA: under-18s can invest £9,000/year tax-free

IV: How to Borrow

Sources of Finance

- A *secured loan* involves you pledging an asset as *security* or *collateral* – the bank can seize the asset if you *default*
  - A *mortgage* is secured against your home
  - A *car loan* is secured against your car
- An *unsecured loan* has no security, e.g. personal loan or credit card
  - If you default, the lender can apply for a County Court Judgment to order you to repay the money. If you ignore the CCJ, the court can send bailiffs
- Unsecured loans have very high interest rates and should always be paid back first
- Mortgages have lowest interest rates as houses are the best security

The Danger of Compounding



Summary

- Saving is “renting out” your money to the bank in return for *interest*
  - Compounding means that interest can have a large effect over time
  - Nominal returns are eroded by inflation and taxes
- Bonds are “renting out” your money to the government or a company
  - Unlike cash, you can’t withdraw it, but you can sell it
  - A bond’s yield takes into account both the coupon and capital gains
- A share is an ownership stake in a company, entitling you to future dividends (and voting rights)
- When the market increase its estimate of future dividends, the stock price rises. Selling will lead to capital gains
- Mutual funds invest in many stocks to benefit from diversification and the fund manager’s expertise (if actively managed)