27. Ratio, Proportion and Rates of Change

Comparing the cost of living in Manchester and Berlin.

Liam has just graduated from university and has received job offers for graduate schemes in Manchester and Berlin. As both jobs are similar in nature and equally appealing, Liam is weighing up the different salary that each job offers alongside the cost of living in each city to work out where he would be better off starting his career.

1. The job in Manchester offers an annual salary of £30,000, while the job in Berlin offers a salary of €35,000. The cost of living in Manchester is estimated to be £18,000 per year and in Berlin, it is €20,000 per year. Taking into account both salary and cost of living, in which city would Liam be better off and why? Assume that the GBP:EUR exchange rate is 1:1.15.

Salary in Berlin in pounds = €35,000 ÷ 1.15 = £30,434.78

Cost of living in Berlin in pounds = €20,000 ÷ 1.15 = £17,391.30

Remaining amount for each city after deducting the cost of living:

Manchester = £30,000 - £18,000 = £12,000

Berlin = £30,434.78 - £17,391.30 = £12,952.48

Liam would be better off by £952.48 per year in Berlin.

2. Liam expects rent in Manchester to be £600 per month and rent in Berlin to be €700 per month. What percentage of Liam's local annual salary would he spend on rent each year in Berlin and Manchester?

Annual rent expense in Manchester = £600 x 12 = £7,200
(£7,200 ÷ £30,000) x 100% = 24%
Annual rent expense in Berlin = €700 x 12 = €8,400.
(€8,400 ÷ €35,000) x 100% = 24%
The rent in each city is an equivalent portion of Liam's gross salary.

3. After reading about cost of living increases in the news, Liam discovers that the cost of living in Manchester is currently increasing by 8% per year whereas in Berlin it is increasing by just 6%. Using the cost of living figures and exchange rates provided in Question 1, if the cost of living increased at the given rates, what would Liam's monthly living costs in both Berlin and Manchester be next year in GBP?

Manchester:
£18,000 ÷ 12 = £1,500/month
£1,500 x 1.08 = £1,620

Berlin:
€20,000 ÷ 12 = €1,667/month
€1,667 x 1.06 = €1,767.02
€1,767.02 ÷ 1.15 = £1,536.53

4. After cost of living expenses are removed from his annual salary, Liam believes that he would be able to save 20% of his remaining salary in Berlin but 25% of his remaining salary in Manchester. Use your answers to Question 1 to work out which of Berlin and Manchester would enable Liam to save more money. Express your answer in GBP.

Manchester: Annual savings = 20% of £12,000 = 0.20 x £12,000 = £2,400

Berlin: Annual savings = 25% of £10,434.78 = 0.25 x £10,434.78 = £2,608.70

Liam would save more in Berlin.

5. Liam's graduate scheme lasts for three years in both Manchester and Berlin. Assume that Liam's salary, exchange rate and and the cost of living in both cities remain constant, and that Liam deposits his savings in a savings account at the **end of each year** that pays him 3% compound interest annually. What would the value of Liam's savings be after three years in each city? Express your answer in GBP.

Future value of savings in…

Manchester after 3 years:

£2,400 x $(1 + 0.03)^2$ = £2,546.16

+ £2,400 x (1 + 0.03) = £2,472

+ £2,400

= £7,418.16

Berlin after 3 years:

£2,608.70 x $(1 + 0.03)^2$ = £2,767.57

+ £2,608.70 x (1 + 0.03) = £2,686.96

+ £2,608.70

= £8,063.23

6. Liam takes the role in Berlin and plans to return to the UK after three years. Assuming that Liam has saved his money in EUR while in Berlin and that GBP is expected to strengthen against the EUR, what is the likely impact on his savings when Liam eventually returns home and exchanges his EUR savings into GBP?

Examples of sensible responses:

- If GBP strengthens against the EUR, this means that GBP can be exchanged for more EUR than previously. This also means that EUR can be exchanged for less GBP than previously.
- As Liam's savings are in EUR while he is in Berlin, the stronger GBP will negatively impact his savings when he exchanges his EUR into GBP because they will be worth less in GBP than previously.