Answers to Economics Interview Practice Questions

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1 Introduction

There may be mistakes with these answers. I have not covered the section 7 as the answers for the logic questions are available online and also the answers to the other questions are more personal.

Note that in general there are multiple different approaches you can take to these questions. For the wordier questions there may be more than one right answer and for the mathematics questions, even if there is one right answer, there are multiple ways to reach that answer.

Note that some of the mathematics questions applied to economics scenarios are slightly longer than what may come up in interview.

2 Pure Maths

To verify the shapes of the graphs, I would recommend typing the formula for the graph into an online graphing software such as the Wolfram Alpha function e.g. here: https://www.wolframalpha.com/input/?i=graphing

You can plug in a value for c e.g. c=1.

Graphs in terms of c are at the bottom of this document.

3 Applications of Mathematics to Economics

3.1 Profit Maximisation

(a) Differentiate with respect to q:

$$\frac{d\pi}{dq} = p - \frac{3}{2}q^{\frac{1}{2}} = 0$$

Rearranging gives:

$$q = \frac{4}{9}p^2$$

Note you may wish to prove this is a local/global maximum of the profit function

(b) This comes directly from the derivative above, or from just rearranging the answer to (a):

$$\frac{3}{2}q^{\frac{1}{2}} = p$$

(c)

$$\frac{dp}{dq} = \frac{3}{4}q^{-\frac{1}{2}} > 0$$

$$\frac{d^2p}{dq^2} = -\frac{3}{8}q^{-\frac{3}{2}} < 0$$

(d) At $q = 0, p = 0$. From (c) we know the function is increasing and concave. The function will look like $y = \sqrt{x}$. See Wolfram Alpha for the exact graph.

(e) Substitute the equation for price into profit:

$$\pi = (10 - q)q - q^{\frac{3}{2}}$$

$$\pi = 10q - q^2 - q^{\frac{3}{2}}$$

Take the derivative to try to find the stationary point, noting that the function above is only defined for $q \geq 0$:

$$\frac{d\pi}{dq} = 10 - 2q - \frac{3}{2}q^{\frac{1}{2}} = 0$$

We can then solve this equation using the quadratic formula for $q^{\frac{1}{2}}$ and square to find q.

$$q^{\frac{1}{2}} = 1.89..$$

$$q = 3.58...$$

We can prove this is a maximum by looking at the second derivative. While exact calculation is not possible in an interview, showing the method or expressing the answer as a fraction may be possible.

3.2 Game Theory and Probability

(a) Report the crime if $v > c$. For simplicity I will assume this assumption of $v > c$ holds for the rest of the question, though you could consider what would happen if this assumption would change.

(b) Given the second witness reports, the first witness gets $v - c$ from reporting and v from not reporting. So the first witness should not report.

Given the second witness does not report, the first witness gets $v - c$ from reporting and 0 from not reporting. Provided the condition in (a) holds, the first witness should report.

(c) If both are not reporting, one person could benefit by deviating to reporting, given the other agent's action remains the same. If both are reporting, one person could benefit by deviating to not reporting. So the two so-called "equilibrium" outcomes are (report, not report) and (not report, report). A 2x2 payoff diagram could be used to illustrate this and would be helpful in explaining your answers.

(d) Expected benefit of reporting for the first witness:

$$p(v - c) + (1 - p)(v - c) = v - c$$

Expected benefit of not reporting for the first witness:

$$pv + (1-p)(0) = pv$$

(e)

$$pv = v - c$$

$$p^* = \frac{v-c}{v}$$

This p^* represents a probability that the other witness reports such that the first witness is indifferent between reporting and not reporting. [Note this is referred to as the mixed strategy Nash equilibrium]

(f) Probability that at least one witness reports the crime is equal to one minus the probability that nobody reports the crime. This is:

$$1 - (1-p)^n$$

As n increases, if p is constant the probability that at least one witness reports the crime increases. But note the probability p may also change (may fall) as n increases. This latter effect would mean the probability that at least one witness reports the crime decreases. So it is unclear overall as to the direction of the effect.

4 Economic Theory

4.1 CEO Pay

There are multiple correct answers here. Possible reasons could include, yet are not limited to, increased globalisation, automation, decreased bargaining power of workers or increased financialisation. You could discuss this through the lens of supply of and demand for CEOs too. It could be good in a sense that high CEO pay attracts the best CEOs to that society but it widens inequality. Pros and cons of high CEO pay could be discussed much further though.

You could try to compare CEO pay to their marginal product of labour or more generally their productivity. We could compare CEO productivity to worker productivity (although both may be hard to measure) or we could compare pay gaps across countries.

An argument for intervention could be that these pay gaps may not reflect productivity differences and widen inequality which could have undesirable consequences (increased social unrest for example). However a negative consequence of intervening could be it becomes harder to attract CEOs to that country, businesses may move abroad or there are reduced incentives to work more broadly. Other arguments may be valid.

4.2 Currencies and Crises

I expect the student to be able to come up with an explanation of how a trader can make money by speculating on the exchange rate. This is standard A-level material or even common sense, eg buy low sell high. They would be expecting the currency to go up in value and I expect the student should be able to list a few reasons this could happen, eg including interest rate changes. For more exchange rate determinants see an A-level textbook.

Speculators can still make money when the currency is fixed/managed. They can bet that the exchange rate is not able to be defended by the central bank. E.g. if the pound is thought to be undervalued, speculators can buy the currency to put pressure on the currency to rise. To keep the fixed exchange rate the same, the central bank has to buy foreign currency to increase the supply of domestic currency or lower interest rates. Eventually if enough speculation occurs the central bank may push interest rates too low causing a bubble/overheating of the economy. Consider the ERM crisis in 1992 in the U.K as an example of this in reverse.

Governments/central banks, if the currency is significantly under- or overvalued, are usually in trouble unless they leave the fixed/managed exchange rate regime. They can try to sustain the exchange rate but this can come with large trade offs as mentioned above. Alternatively they could use capital controls, blocking money flows in and out of the country but this again is an extreme measure with trade offs. If the student is aware of

the impossible trinity of fixed exchange rate, free monetary policy and free capital flows this could be raised too but is not required.

5 Current Affairs

Increased uncertainty and/or lower expected future growth could be possible reasons. I would expect the chains of analysis to be fully explained.

Brexit means less trade with the European Union. There is a possibility of more trade with the rest of the world in the future. I would expect students to be able to explain fully why these things might occur and to try to weigh up which effects might be greater. If you give one opinion, you may be challenged to argue the opposite.

Unilateral tariff reduction would lead to welfare gains (see discussions of tariffs in A-level economics), meaning lower prices for consumers and firms that import some of their inputs. But it may harm domestic producers and reduce negotiating power when making future trade deals. Other arguments may be valid e.g. some tariffs on goods that cause negative externalities may improve social welfare.

6 Reading an Article

The multiplier effect means a small increase in (in this case) government spending leads to a larger increase in say real GDP. If you have not come across the multiplier effect before then a short question and answer with the interviewer may take place to understand the idea. If we just looked at data on government spending and the real GDP of the economy, there

are many other factors that could influence the real GDP of the economy, so this would not really be a fair test. Also government spending may vary because real GDP varies - the causation could be reversed.

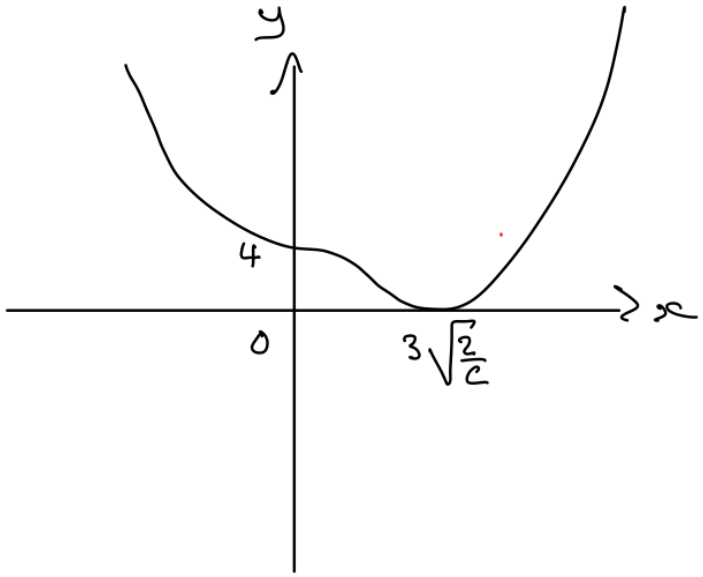
The paper uses the natural experiment where city councils are dismissed and spending on public investment is briefly stopped. These incidents are generally not correlated with real GDP of the local area.

There is a section in the article on this. For example, the effects of government spending changes may depend on whether government spending is expected to be cut in the future. Budget adjustments are "less of an issue" at the local level as there is no effect on local taxation.

The multiplier matters because it determines the effectiveness of government spending proposals. If the government is determining how much to spend on a stimulus package or how much spending should be cut to control inflation without damaging real GDP too much, the multiplier may be helpful. It could also be useful to estimate future tax revenue from the effect of government spending changes on real GDP (more business activity presumably means higher tax revenue).

There is no particular answer in mind for the last part of the question. Some of the possible issues are addressed by the paper. Think about what assumptions may be required here.

$y = (2 - cx)^3$, $c > 0$



$$y = x\left(c + \frac{1}{x^2}\right)$$