

SIMON FRASER UNIVERSITY
Department of Economics

Econ 305
Intermediate Macroeconomic Theory

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MIDTERM EXAM
(Solutions)

The first three questions are True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (10 points each).

1. Countries with higher per capita GDPs have higher standards of living.

UNCERTAIN. *Empirically, this is more or less true. Most international immigration takes place from countries with low per capita GDPs to countries with high per capita GDPs. But not all. (Case in point - my wife and I left higher paying jobs in the US to come to Canada!) Believe it or not, there is more to life than money (eg, safety, environment, etc). Of course, if things like safety and clean air are truly valued then you would expect richer countries to be safer and cleaner, and they generally are, but these sorts of amenities are often provided at least partly by the government (due to externalities), and some governments do a better job than others. Besides, people differ in how they value these non-market amenities, so a higher standard of living for one person might be a lower standard of living for someone else (many of my US colleagues think I was crazy to move to Canada!)*

2. Real GDP cannot grow faster than nominal GDP.

FALSE. *If there is deflation (negative inflation), then real GDP growth will exceed nominal GDP growth.*

3. The Malthusian growth model can explain why China has such a large population.

TRUE/UNCERTAIN. *According to Malthus, technological progress leads to more rapid population growth. 1000 years ago, China was the most technologically advanced country. Of course, there are many other factors involved (eg, geography and climate), so Malthus cannot be the full story.*

4. (20 points). Compare and contrast the role of wages in the neoclassical labor market model discussed in Chapter 4 of the textbook with the role of wages in the Diamond-Mortensen-Pissarides (DMP) search model discussed in Chapter 6 of the textbook. Explain why the DMP model generally produces a socially inefficient amount of unemployment.

The neoclassical model operates according to Adam Smith's 'invisible hand'. Wages adjust to reconcile households' labor supply with firms' labor demand. Households and firms react to wages. In contrast, in the DMP search model, wages play no allocative role. They are negotiated ex post, after a match has formed. Instead, the equilibrating force in the DMP model is the vacancy/unemployment ratio (labor market 'tightness'), which determines the match probability. The DMP model generally produces a Pareto inefficient unemployment

rate because there are search/congestion externalities. When I look for a job, it makes it a little harder for you to find a job. (In class, I briefly mentioned directed search models as being a compromise between the neoclassical and DMP models, which combines features of both. I would be surprised if anyone mentions this, but if they do, give them a little extra credit).

5. (25 points). Explain why the Solow model cannot generate sustained growth in per capita income without introducing exogenous technological progress. Explain how the Lucas human capital model overcomes this deficiency. What is the key assumption Lucas makes about the process of human capital accumulation? What evidence does he use to support this assumption? Explain how Romer's learning-by-doing externalities model can also generate endogenous growth. Briefly discuss the policy implications of the Lucas and Romer growth models. Is the growth rate produced in these models socially efficient? If not, can you think of any Pareto improving government policies?

The Solow model cannot generate sustained growth in per capita income due to diminishing returns to capital accumulation. The only way to generate sustained growth is to introduce technological progress, but the model itself does not explain this process. Hence, in the Solow model, sustained growth in per capita income is exogenous. (Of course, the model can explain episodes of temporarily faster growth, due to 'transition dynamics'). Lucas shows that sustained growth can occur if we allow individuals to accumulate 'human capital', which makes them more productive. The key difference between human and physical capital in his model is the assumption that human capital is NOT subject to diminishing returns, at least at the economy-wide level. (For an individual it obviously is, since individuals have finite lifetimes, and it takes time to accumulate human capital). He notes that there is little evidence that observed skill premia in the labor market are declining. Your incentive to go to college is not lower than the incentive your parents and grandparents had. If anything, it is greater. If economy-wide human capital accumulation were subject to diminishing returns, you would expect the returns to education to diminish over time. Romer overcomes diminishing returns by assuming that firms become more productive as they continue to produce. They 'learn-by-doing'. Importantly, he assumes that this learning process is external to individual firms. Firms learn from the aggregate investment of other firms, but not from their own individual experience. This allows him to continue to assume a competitive, price-taking market. Sustained growth in the Romer model can occur if the positive externalities of learning-by-doing are sufficient to offset the forces of diminishing returns. Due to the positive learning externalities, the equilibrium growth rate is obviously suboptimally low. Firms are not capturing the full benefits of their own investments. As a result, the government should subsidize investment. In principle, the Lucas model might produce a Pareto efficient equilibrium growth rate, if individuals fully capture the benefits of their own education. However, Lucas argues that there are likely positive externalities associated with human capital accumulation, at least at the aggregate level. If so, the government should subsidize education. (Caveat: Beware of policy prescriptions that benefit the person making them!)

6. (25 points). The covid pandemic has had major economic repercussions, as well as being a major source of increased health risks. Interestingly, stock markets in most countries haven't been affected that much. In fact, stock prices are generally higher now than before. In contrast, stock markets plunged during the 2008-09 financial crisis. Why do you think this is? What explains the difference between the pandemic and the financial crisis? (Hint 1: Not

all companies issue stock. Hint 2: There is no single right/wrong answer here!).

From the perspective of the Fisherian intertemporal model of consumption/saving, how should the real interest rate respond to the pandemic? Explain how we could use evidence from the bond market to assess the expected duration of the pandemic.

This is obviously a very open-ended question, and answers are likely to be all over the map. Please be generous with partial credit. Use your own judgment about whether an answer makes sense. For the first part, I had two things in mind. First, stock market indices mainly summarize the fortunes of large firms. Small, family-owned, businesses don't issue equity. Generally speaking, the pandemic has mainly affected small firms. Large firms have not been damaged as much. In fact, many have prospered (eg, Amazon). Of course, there are exceptions (eg, airlines). Second, and perhaps more importantly, stock prices are forward-looking. They reflect a present-value calculation of the entire future sequence of a firm's profits. As a result, a single bad year would not be expected to have a large effect on a stock price (especially when interest rates are so low). Initially at least, the pandemic was expected to be quite transitory. In contrast, the 2008 financial crisis had a much bigger effect on larger firms, especially financial conglomerates. In addition, it was not at all clear how long it would take to unwind the massive amount of leverage that had built up in the years leading up to the crisis. Debt reduction is a gradual process. So for both reasons, it is not surprising that the stock market dropped a lot more.

As always, financial markets provide useful information about people's expectations. Given that the pandemic was expected to be temporary, the Fisherian model predicts a rise in the short-term real interest rate, as everyone tries to borrow in response to temporarily low income. (If only one country was affected, it would run a current account deficit, and the interest rate would not change). Since long-term interest rates reflect an average of future short-term interest rates, we would not expect long-term bond yields to rise as much. That is, the Fisherian model predicts a yield curve 'inversion' (short-rates higher than long rates). Moreover, we could get a market-based assessment of the duration of the pandemic by looking at the slope of the yield curve. I don't think anyone has done this yet! (Perhaps because too many other confounding factors would need to be controlled for. For example, part of the response has been to monetize government debt issue, which creates future inflation risk, which would then tend to raise long-term nominal yields relative to short-term nominal yields. So it would be important to distinguish between real and nominal interest rates. BTW, we haven't even begun to talk about inflation and the yield curve yet, so don't expect many students to provide answers along these lines. But if they do, give them some extra credit!)