Professor Robert Staiger Fall 2021/22

Economics 39F: Final Exam

Please be concise and to the point. Print your name on your exam and turn it in with your blue books. You have 3 hours (but I doubt you will need it). The exam has 100 points. Answer all 3 questions. You should spend the first 10 minutes reading the exam. Good luck!

1. (50 points) The just-concluded 26th United Nations Climate Change Conference in Glasgow (known as COP26) has raised many issues for the global economy that will have to be addressed as countries race to prevent global carbon emissions from leading to atmospheric carbon levels that would be catastrophic for the future of life on the planet. An issue that has come to the forefront in drafting an agreement at the COP26 conference is whether industrialized countries (the "global north") will agree to pay what amounts to reparations – or in the language of the COP26 conference, payments for "losses and damages" – to developing countries for the harm that these countries will suffer from climate change. As one *New York Times* article noted in its summary of the COP26 conference:

"One of the most divisive questions involves countries of the global north — which have prospered for over a century by burning coal, oil and gas and spewed greenhouse gases into the atmosphere — and whether they should compensate developing countries for the irreparable harms they have caused. The draft proposes a new "technical assistance facility" to help countries with losses and damages…"

The proposed international transfers from industrialized countries to developing countries would likely be massive, and the Biden Administration is interested in assessing their economic implications for the United States. You have been hired as a winter intern by the US Special Presidential Envoy for Climate John Kerry to help in this assessment. Kerry has done a back-of-the-envelope calculation and has concluded that (i) the face value of the transfer that the US will make to developing countries is a good approximation of the true economic cost to the US economy in terms of foregone consumption, and (ii) if every citizen in the US is asked to contribute equally to the fiscal cost of the transfer (i.e., if, in order to fund the transfer, each US citizen receives a tax bill from the government for the same amount), then all US citizens will share the overall economic burden of the transfer equally. Knowing that you are an expert in international trade, Kerry wants you to use your knowledge of trade models to check his calculations.

In particular, please answer the following questions that Envoy Kerry has raised. Throughout, you may assume that there are two countries, the US (representing the global north) and Bangladesh (representing the developing world) and two goods, clothing and appliances, with the US exporting appliances in exchange for imports of clothing from Bangladesh under conditions of global free trade. Moreover, Kerry's staff has discovered that the clothing exported by Bangladesh to the US can be best thought of as "fast fashion" (i.e., cheap and disposable production of clothing based on trends and rapid consumption) which is an item that makes up a large share of every additional dollar spent by US consumers but only a small share of every additional dollar spent by consumers in Bangladesh, so please make use of this fact in your analysis.

a) First, using the Basic Trade Model and assuming that both the US and Bangladesh are large countries, assess whether or not the face value of the transfer from the US to Bangladesh will accurately reflect the cost to the US of the transfer in terms of forgone consumption.

b) Second, using the assumptions of the Specific Factors Model to represent the US economy in the short run, with appliance-specific capital stuck in the appliance sector, clothing-specific capital stuck in the clothing sector, and labor mobile between the appliance and the clothing sectors, build on your answer from part (a) to assess whether or not all US citizens (i.e., all US factor owners) will share the burden of the transfer equally in the short run as long as they are all asked to contribute equally to the fiscal cost of the transfer.

c) Third, using the assumptions of the Heckscher-Ohlin Model to represent the US economy in the long run, with capital and labor both mobile between the appliance and the clothing sectors and with appliances the capital-intensive good and clothing the labor-intensive good, build on your answer from part (a) to assess whether or not all US citizens (i.e., all US factor owners) will share the burden of the transfer equally in the long run as long as they are all asked to contribute equally to the fiscal cost of the transfer.

d) Finally, Envoy Kerry is also concerned about the economic impacts of the possibility of climate refugees from Bangladesh arriving in the United States in future years, and he asks that you provide him with an analysis of this issue. In particular, he asks that you consider the short run and long run impact on the US distribution of income of an increase in the US labor supply (generated by a rise in "climate refugees"), using the Specific Factors Model described in part (b) above to perform the short run analysis and the Heckscher-Ohlin Model described in part (c) above to perform the long run analysis. For this analysis (and in contrast to your analysis above), he tells you that you can assume that the US is a small open economy and therefore takes the world prices of appliances and clothing as given and fixed (and you may also assume that the influx of climate refugees is small enough that the US continues to produce both goods).

2. (30 points) Using the Continuum-of-Goods Ricardian Trade Model, suppose that the home-country unit labor requirement for good $z \in [0,1]$ is given by $\ell(z) = 1 + \theta \times z$ while the foreign-country unit labor requirement for good $z \in [0,1]$ is given by $\ell^*(z) = 1 + \theta^* \times z$, with $\theta \geq 0$ and $\theta^* \geq 0$. Let us interpret $\theta \times z$ as the amount of labor required to comply with the pollution standard of the home country when producing one unit of good z in the home country given the home-country standard θ. Likewise, $\theta^* \times z$ is the amount of labor required to comply with the pollution standard of the foreign country when producing one unit of good z in the foreign country given the foreign-country standard θ^*. So we can think of low-z goods as "naturally clean" goods, because for a given pollution standard it doesn't take much labor to clean up the production process and meet the standard for low-z goods (e.g., for a given standard $\theta > 0$, $\theta \times z$ will be small for a low-z good), while we can think of high-z goods as "naturally dirty" goods.

a) Show that, if the home country has a strict environmental standard while the foreign country has none (i.e., if $\theta > 0$ and $\theta^* = 0$), then the home country will specialize in a range of naturally clean (low z) goods.

b) Then show that if the world's preferences shift away from consumption of dirty goods and toward consumption of clean goods (so that the budget shares b(z) for the low-z goods originally produced in the home country rise and the budget shares for high-z goods originally produced in the foreign country fall), then the foreign country, with its lax/nonexistent pollution standards, will ironically *gain* competitiveness and begin exporting a range of goods that, prior to the world's preference shift toward cleaner goods, it would have imported from the home country. Explain intuitively why this is so.

3. (20 points) Using the 2-good, 2-country Ricardian trade model, with countries trading freely and with the foreign country initially specialized in production according to its comparative advantage and with the home country initially producing positive amounts of both goods, show that if "climate refugees" were to begin leaving the foreign country and coming to the home country (thereby reducing the foreign labor endowment L^* and increasing the home labor endowment L by the same amount), the arrival of climate refugees in the home country would not alter the real per-capita income (and hence the real wage of labor) in the home country.

Extra Credit (5 points) Pose a question on a trade policy topic that your uncle might ask you at the Thanksgiving dinner table this Thursday, and provide an answer that, while supported by the models we have covered in Econ 39 this Fall, you have translated into words and intuitive explanations that your uncle could appreciate without having taken Econ 39 himself.