

**Economics 165: Midterm**

Please be concise and to the point. Print your name on your exam and turn it in with your blue books. You have 110 minutes. Answer Part I, and 2 questions from Part II. Good luck!

**Part I**

1. (40 points) In their Case Study “Box” on the transfer problem and the Asian Crisis, Krugman and Obstfeld observe that, despite experiencing a sudden reversal of international capital flows (i.e., a sudden stop of international transfers from the rest of the world) beginning in 1997, the affected Asian countries did not suffer a significant terms-of-trade deterioration after 1997 as Keynes would have argued, although their rates of growth did slow dramatically after 1997. At the same time, as we discussed in class, Acemoglu and Ventura suggest that countries experiencing an export-biased growth spurt relative to the world will suffer a terms-of-trade decline and, as a result, subsequently experience slower-than-world-average growth. As we observed in class, a number of countries that were at the center of the Asian Crisis seemed to provide exceptions to the Acemoglu-Ventura story up through 1997, but probably not thereafter. With this background, use the 2-Country Basic Trade Model to:

- (a) perform an analysis of the Keynes case for the terms-of-trade effects of an international transfer;
- (b) perform an analysis of the terms-of-trade effects of export-biased growth; and
- (c) use your analysis from parts (a) and (b) above to construct a possible explanation for the following three “facts”: (i) the Asian countries did not conform to Keynes’s expectation that their terms-of-trade should have worsened when they stopped receiving large transfers from the rest-of-world after 1997; (ii) for a period leading up to the 1997 Asian Crisis, the Asian countries did not conform to the Acemoglu-Ventura story that they should not have been able to sustain rapid rates of export-biased growth relative to world growth rates; and (iii) after the 1997 Asian Crisis and with the end of transfers from the rest of the world, the affected Asian countries did conform to the Acemoglu-Ventura story that they could not sustain rapid rates of export-biased growth relative to world growth rates. (Note: you can take as given the link from a worsening terms-of-trade to a slowing growth rate that Acemoglu and Ventura derive).

**Part II** (Choose 2 of the following 3 problems).

2. (30 points) Suppose that a country is endowed with 10 units of capital and 10 units of labor, and that it can produce 2 goods,  $x$  and  $y$ . Good  $x$  can be produced with inputs of capital and labor according to a constant-returns-to-scale technology that exhibits typical “smoothly substitutable” isoquants. Good  $y$  can also be produced with inputs of capital and labor according to a constant-returns-to-scale technology, but the isoquants for good  $y$  are “right angles” (Leontief isoquants) and employ capital and labor in fixed and equal proportions. Using the properties of constant-returns-to-scale technologies derived in class (i.e., you do not need to re-derive these properties here),

- (a) demonstrate what the country’s Production Possibilities Frontier must look like;
- (b) depict the country’s autarky prices assuming that the country’s preferences are such that it consumes positive amounts of both goods  $x$  and  $y$  in autarky; and
- (c) depict the country’s production, consumption and trade if it trades freely with a “large” rest-of-world whose price of  $x$  relative to  $y$  is lower than this country’s autarky price of  $x$  relative to  $y$ .

3. (30 points) Consider two large countries, A and B. A imports good  $x$  and exports good  $y$ , while B imports good  $y$  and exports good  $x$ .

- (a) Show that a *reciprocity rule* implies a fixed terms of trade if the rule requires that negotiated tariff changes must induce changes in a country's import volume that are equal to the changes in its export volume, in the particular sense that

$$p^{w0}[M_x^{A1} - M_x^{A0}] = E_y^{A1} - E_y^{A0},$$

where  $p^w$  is the relative price of  $x$  to  $y$  on world markets, and where "0"- and "1"- superscripts denote "pre-negotiation" and "post-negotiation" magnitudes, respectively (and where  $M_x^{A1} > 0$  by assumption).

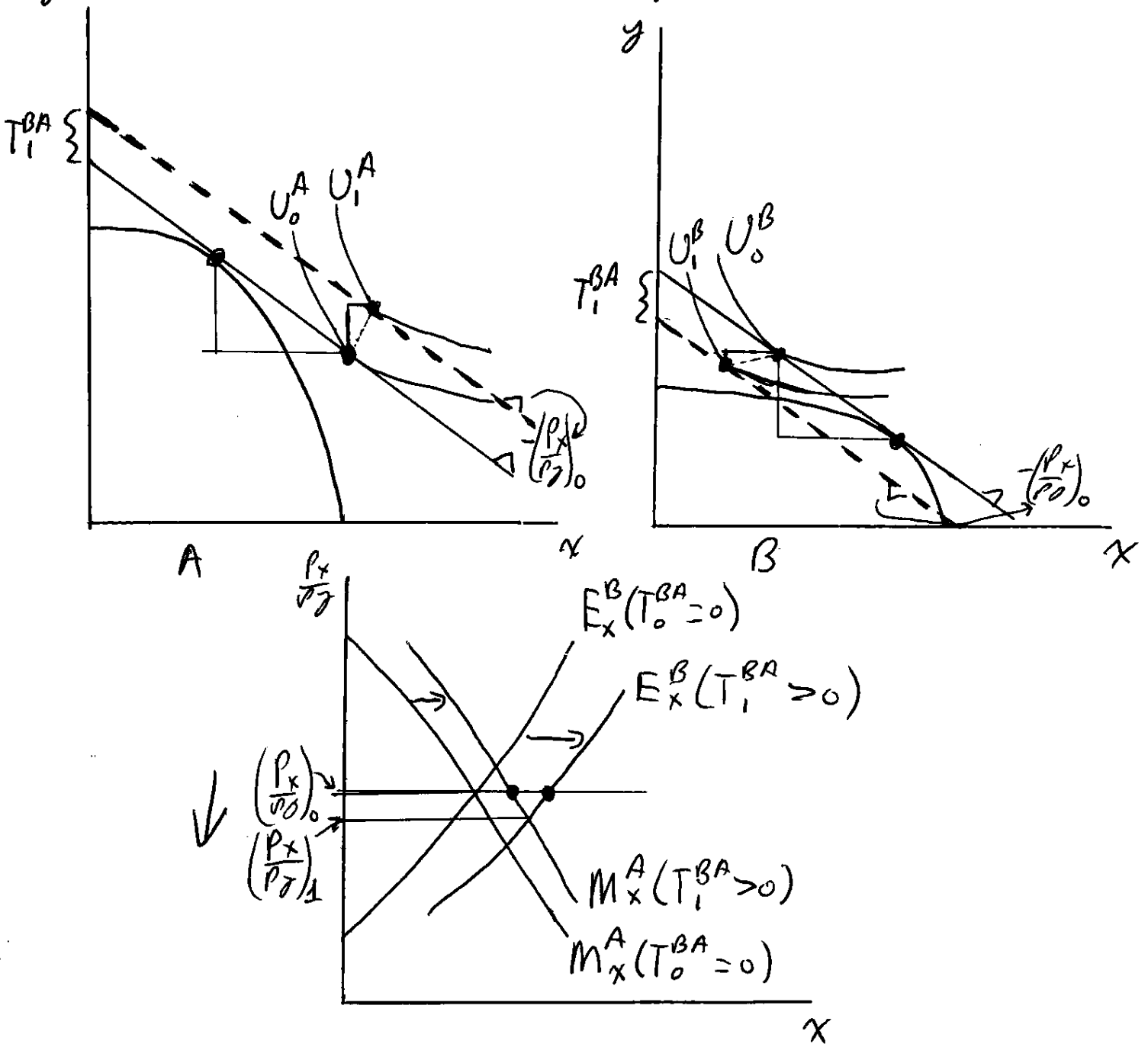
- (b) Next show (with math or graphs) that, starting from the tariff choice that A would make unilaterally (i.e., absent negotiations with B), A would desire to lower its tariff in a negotiation with B if the negotiation satisfied the reciprocity rule described in part (a) above.

4. (30 points) Consider a small country that imports good  $x$  and exports good  $y$  and is initially trading freely with a "large" rest-of-world, and whose citizens are all the same and have homothetic preferences. The government of this country is concerned about the health of its (representative) citizen: in particular, according to a new health study, the citizens of this country are consuming good  $x$  and  $y$  in a relative proportion that constitutes a perfectly well-balanced diet, but they are eating too much.

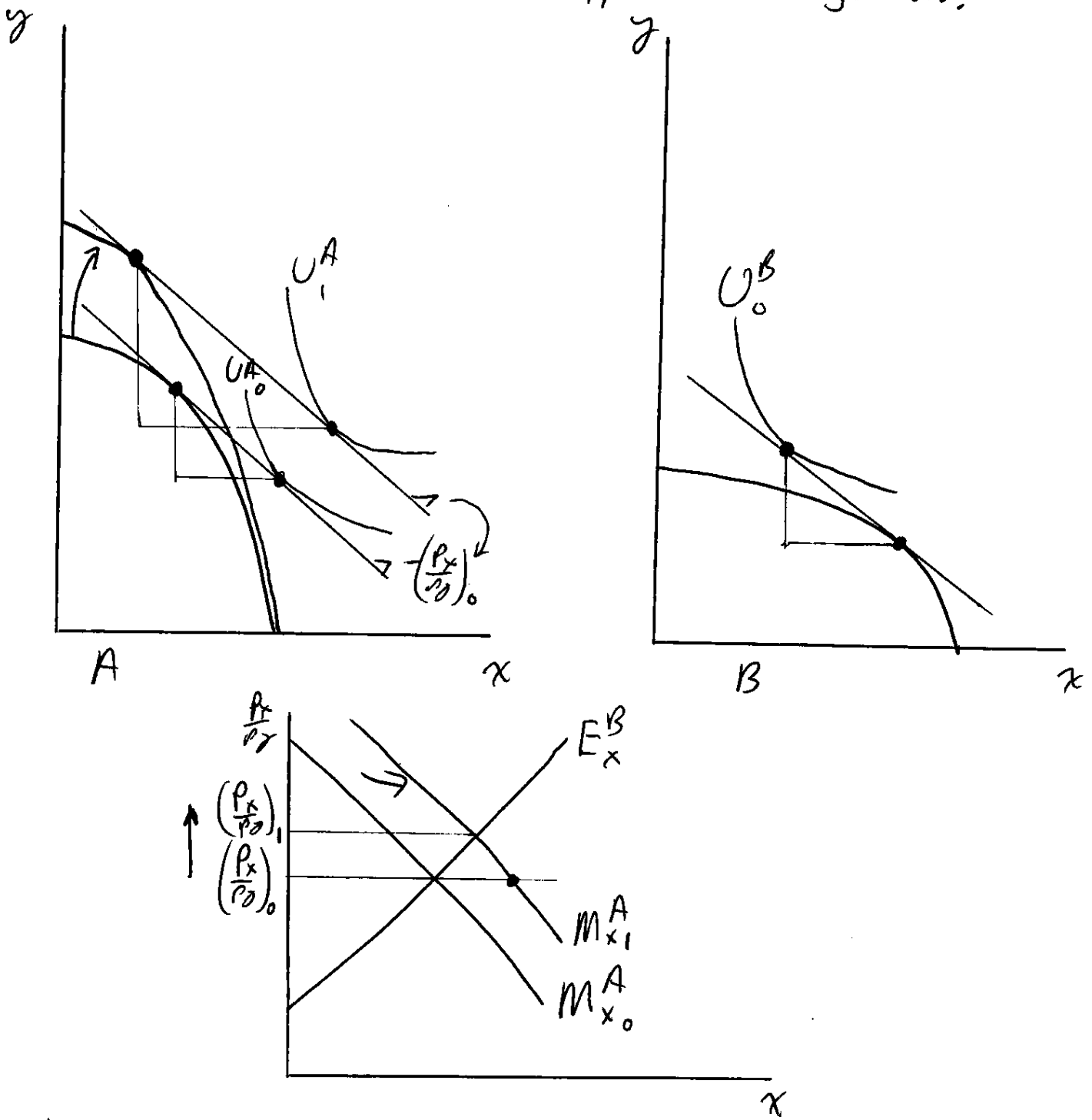
- (a) Using the Basic Trade Model, and assuming that the government cannot force its citizens to violate their budget constraints (so that balanced trade must be maintained throughout), provide a ranking, from best instrument to worst instrument, over an import tariff, a production subsidy, and a consumption tax, for achieving a health improvement for the representative citizen of this country.
- (b) Offer an interpretation of the ranking you provide in part (a) above according to the logic of the "targeting principle" discussed in class.

Economics 165 ①  
 Sketch of Answers to Midterm  
 Winter 2007/08

1. (a) The Keynes case: A receives a transfer  $T^{BA}$  from B, A's terms-of-trade improve (B's terms-of-trade worsen).



(b) Terms-of-trade effects of export-biased growth.

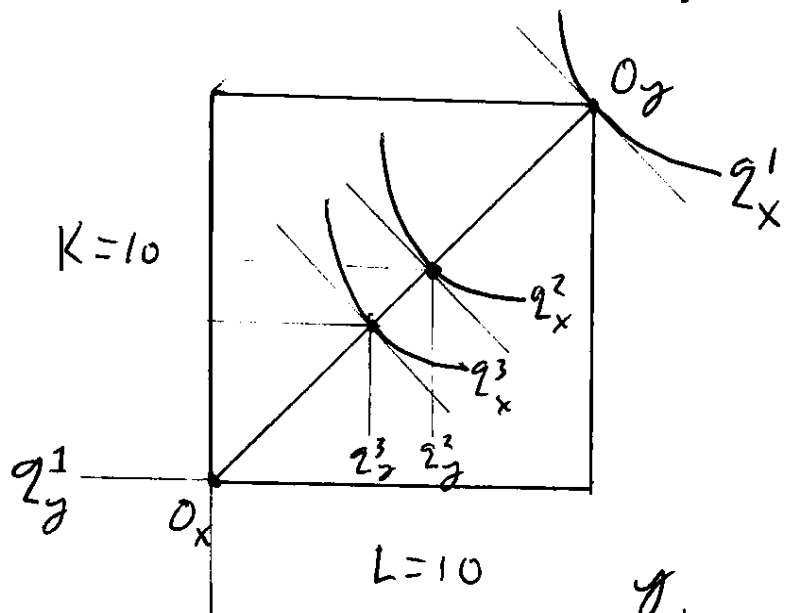


A's export-biased growth worsens its terms of trade.

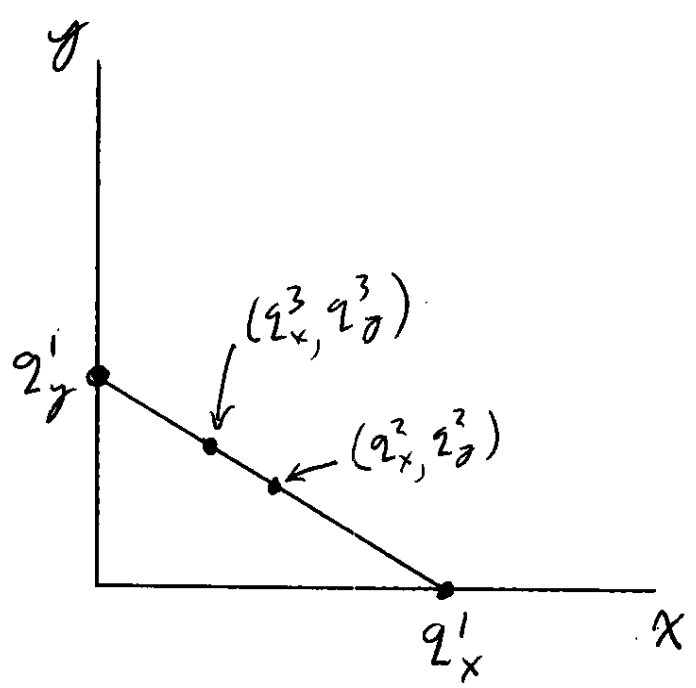
- Export-biased growth expands exports at original  $(\frac{P_x}{P_y})_0$ , but balanced trade implies  $(\frac{P_x}{P_y})_0 M_{x_0}^A = E_{y_0}^A$ , so A's export-biased growth expands its imports at original  $(\frac{P_x}{P_y})_0$  as well, as depicted.

(c) We can use the analysis of (a) and (b) to explain the 3 "facts" listed in (c) as follows. Prior to 1997, the countries under consideration were (1) receiving large transfers from the rest-of-world and (2) growing rapidly relative to rest-of-world. So these countries were like Country A in (a) and (b) -- with the qualification that rest-of-world growth in (b) is depicted as stagnant, so A's growth should be interpreted in (b) as relative to B's as we showed in class. As (a) and (b) indicate, receiving large transfers and experiencing fast export-biased growth have opposing effects on the terms of trade. If these opposing effects approximately cancelled each other, then A could grow faster than B in an export-biased fashion without causing its terms-of-trade to worsen. Hence, these Asian countries could ~~escape the problem~~ and continue a growth spurt described by Acemoglu & Ventura as long as they kept receiving transfers (up until 1997), but not after the transfers stopped (after 1997). This explains "fact" (ii) and "fact" (iii). It also explains "fact" (i), because once the transfers stopped, so did export-biased growth in these countries, and so no worsening of the terms-of-trade occurred. What is not explained by this story is why the capital inflows suddenly stopped.

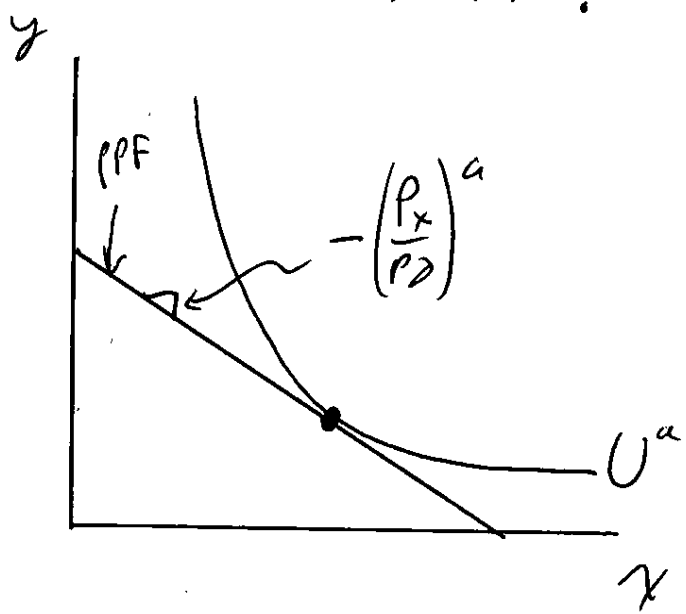
2. (a) Using an Edgeworth Box, the fact that both technologies are CRS (and hence, as shown in class, isosquant slopes depend only on the ratio of capital and labor used in production), the fact that good  $y$  is produced with a Leontief technology, and the fact that good  $y$ 's technology uses capital and labor in the same (fixed) proportion as the country's endowments (i.e., one-to-one), we have:



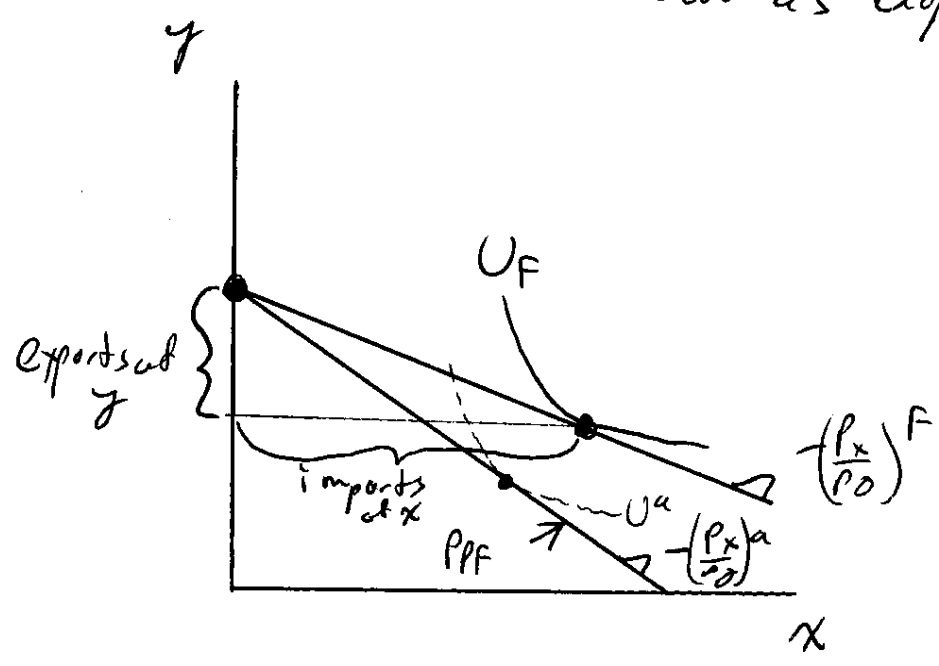
The PPF is a straight line, because, in light of (i)  $y$ 's Leontief technology, and (ii) the fact that  $y$  uses  $K$  and  $L$  in the same proportion as the country's endowment, it is never optimal to change factor proportions along the PPF in this case.



(b) As long as the country consumes both  $x$  and  $y$  in autarky, as stated, it must then produce both  $x$  and  $y$  in autarky, and the autarky prices are given by the slope of the (linear) PPF:



(c) If this country can trade freely at  $(\frac{P_x}{P_y})^F < (\frac{P_x}{P_y})^a$  as stated, then it will specialize in producing  $y$  and produce, consume and trade as depicted below:



3. (a) Starting with Reciprocity definition

$$\textcircled{\text{I}} p^{w0} [M_x^{A1} - M_x^{A0}] = E_y^{A1} - E_y^{A0},$$

(1) use BT at  $p^{w0}$  ( $p^{w0} M_0^A = E_y^{A0}$ )  
to convert  $\textcircled{\text{I}}$  to

$$\textcircled{\text{II}} p^{w0} M_x^{A1} = E_y^{A1}, \text{ and}$$

(2) then use BT at  $p^{w1}$  ( $p^{w1} M_x^{A1} = E_y^{A1}$ )  
to convert  $\textcircled{\text{II}}$  to

$$\textcircled{\text{III}} (p^{w1} - p^{w0}) M_x^{A1} = 0$$

which implies  $p^{w1} = p^{w0}$  and hence  
no change in  $p^w$  as long as  $M_x^{A1} > 0$ .

(b) Using math is easiest here. Let A's preferences be represented by  $W^A(p^A(z^A, \tilde{p}^w), \tilde{p}^w)$  and impose  $\frac{\partial W^A}{\partial p^w} < 0$ , for A importing X and  $p^w$  the relative price of X to Y on world markets and  $p^A$  the relative price of X to Y domestically in A. We also have that  $\frac{\partial \tilde{p}^w}{\partial z^A} < 0$ , and  $\frac{dp^A}{dz^A} > 0$ .

(7)

A's unilateral choice of tariff ( $\tau^A$ ) must satisfy

$$\textcircled{\text{IV}} \quad \frac{\partial W^A}{\partial p^A} \frac{dp^A}{d\tau^A} + \frac{\partial W^A}{\partial p^w} \frac{\partial \tilde{p}^w}{\partial \tau^A} = 0.$$

But with  $\frac{\partial W^A}{\partial p^w} < 0$  and  $\frac{\partial \tilde{p}^w}{\partial \tau^A} < 0$ , we

have that  $\frac{\partial W^A}{\partial p^w} \frac{\partial \tilde{p}^w}{\partial \tau^A} > 0$ , and so

when  $\textcircled{\text{IV}}$  is satisfied it must be that

$$\frac{\partial W^A}{\partial p^A} \frac{dp^A}{d\tau^A} < 0, \quad \text{which with } \frac{dp^A}{d\tau^A} > 0$$

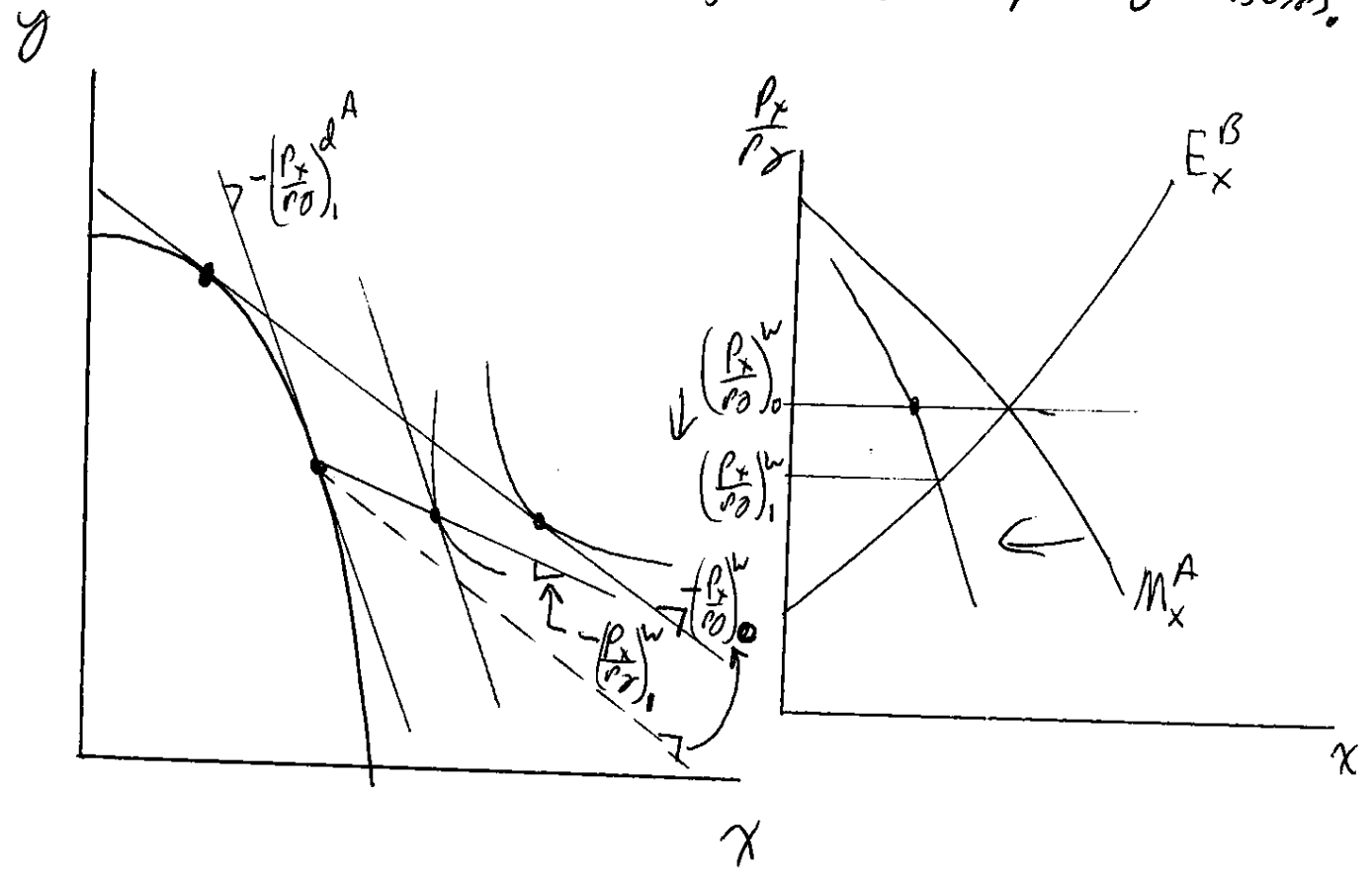
then implies  $\frac{\partial W^A}{\partial p^A} < 0$ .

So, at A's unilateral tariff choice (i.e., when  $\textcircled{\text{IV}}$  is satisfied), we must have

$$\frac{\partial W^A}{\partial p^A} < 0. \quad \text{This means that A would}$$

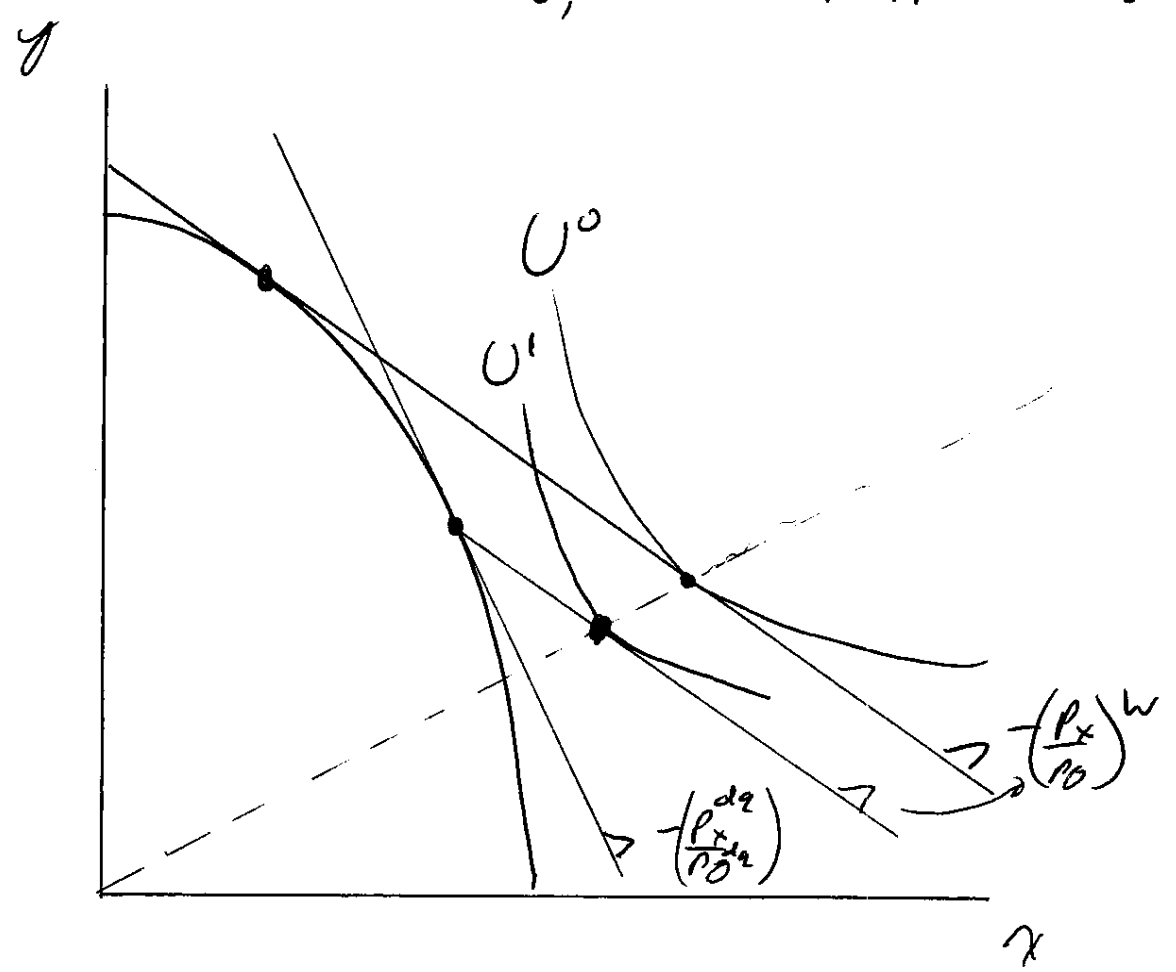
like to reduce  $\tau^A$  so that  $p^A$  falls and (by  $\frac{\partial W^A}{\partial p^A} < 0$ )  $W^A$  rises, if  $\tilde{p}^w$  does not change in the process. But reciprocity assures that  $\tilde{p}^w$  will not change.

Alternatively, using graphs, this can be illustrated by noting that, on the margin, when A has set its unilaterally optimal tariff, it must be indifferent to the changes that a small increase in  $Z^A$  would imply. But when  $Z^A$  is increased a little, 2 things happen:  $P^A$  increases a little, and  $P^W$  falls a little. As depicted in the graph below, the fall in  $P^W$  is good for A, and so the rise in  $P^A$  must be bad for A if the above-stated indifference condition is to be met. Hence, A would like to reduce  $Z^A$  and therefore  $P^A$ , if this were not accompanied by a reduction in  $P^W$ , which reciprocity ensures.



4. (a) According to the problem, the government would like to induce its citizens to eat less but keep the same "well-balanced" ratio of consumption of  $x$  to  $y$ . With homothetic preferences (and budget balance, as assumed), the best way to achieve this would be to simply reduce income and keep consumers facing the same relative prices for consumption.

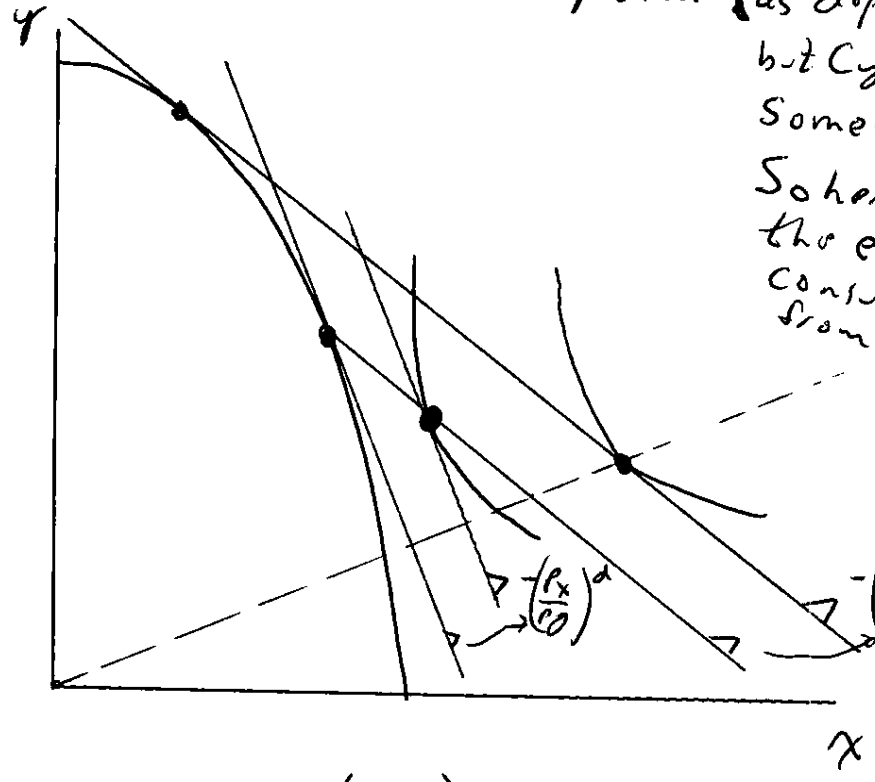
As depicted below, a production subsidy can do this (to  $x$  or  $y$ , but I will illustrate for  $x$ ):



Production Subsidy to  $x$  producers

An import tariff can also reduce consumption of  $x$  and  $y$ , but cannot do so in a way that preserves the "well-balanced" ratio of consumption (as depicted,  $C_x$  falls, but  $C_y$  actually rises somewhat).

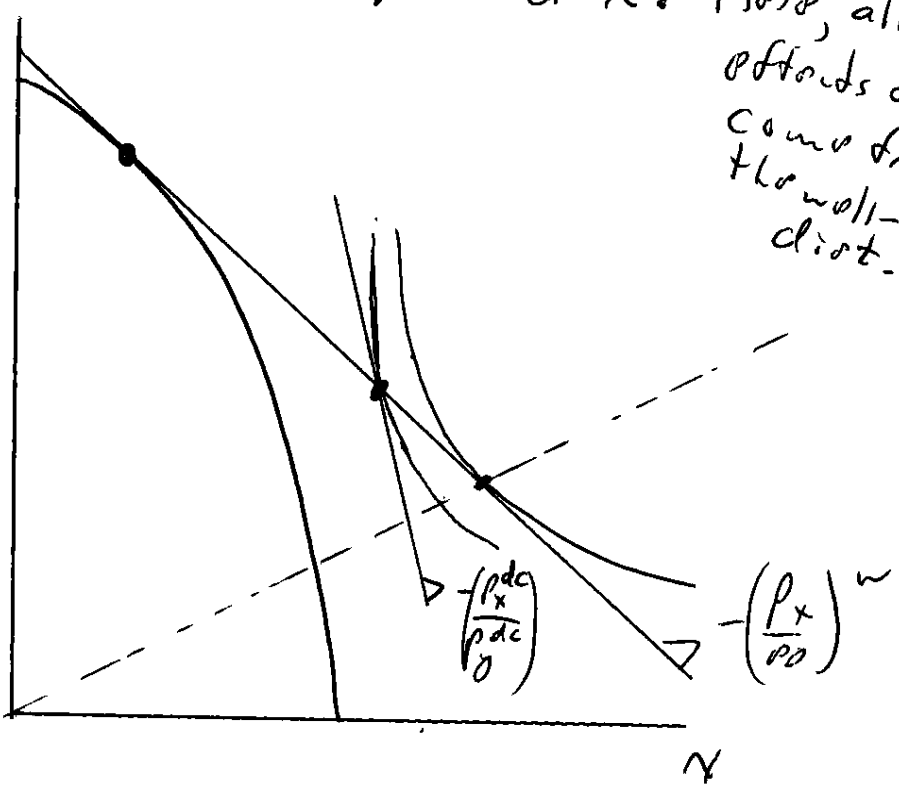
Import tariff



So here, some of the effects on consumption come from altering the well-balanced diet.

Finally, a consumption tax <sup>(on x)</sup> must increase consumption of  $y$  while decreasing consumption of  $x$ : Here, all of the effects on consumption

Consumption tax on x



effects on consumption come from altering the well-balanced diet.

(11)

So the policy ranking would be

- a production subsidy is best, because it reduces the volume of eating without altering the balance of the diet.
- a tariff is second best, because it also alters the balance of the diet.
- a consumption tax is third best, because it only alters the balance of the diet.

(b) The ranking in (a) above conforms to the targeting principle discussed in class, once it is noted that the margin on which the government hopes to alter behavior is the total amount of consumption, not the ratio, and if consumers satisfy their budget constraints (as we have assumed) then the government must reduce income to reduce expenditure, and a production subsidy does this without distorting consumer decisions over the balance of their diet. (It does distort producer decisions, but that is what is desired here to reduce income + hence total consumption).