



# Quality and trade <sup>1</sup>

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## Abstract

We present a model of trade in which similar countries trade more with each other than with very different countries. The reason is that high human capital countries have a comparative advantage at producing high quality goods, but are also rich enough to want to consume high quality. As a result, countries choose trading partners at a similar level of development, who produce similar quality products. The model helps account for the observed trade patterns, and sheds light on international income comparisons. It also helps explain recent concerns of Eastern European countries that they have ‘nothing to sell’ to the West. © 1997 Elsevier Science B.V.

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## 1. Introduction

Policy-makers in Eastern Europe are concerned that the volume of trade their countries can achieve with Western Europe is very low. One reason for this concern is that the quality of Eastern European goods is so low that West Europeans do not want them, and that Western European consumer goods are too expensive for Eastern European consumers. This concern is ill-founded in a

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Heckscher–Ohlin trade model, where very different countries such as those of Eastern and Western Europe must have plenty to gain from trade. In that model, labor intensive goods would flow from Eastern to Western Europe, and capital intensive goods would flow back.

In this paper, we show that in contrast with the standard model, the policy-makers' concern is well founded when goods have a significant quality dimension. High income countries of Western Europe both produce and demand high quality goods, whereas low income countries of Eastern Europe both produce and demand low quality goods. More specifically, countries rich in human capital produce high quality goods, but also demand high quality goods because human capital makes them wealthier. On the other hand, countries poor in human capital produce low quality goods because they have low skills and so cannot make high quality goods efficiently, and also prefer lower quality goods than rich countries do because they do not want to spend too much on quality. In principle, rich countries could produce lower quality goods for export to poor countries in exchange for grain, steel or other goods for which achieving quality is not as human-capital-intensive. But we argue that countries rich in human capital typically have a comparative disadvantage at lower quality goods relative to high quality goods, and therefore cannot profitably export them to poor countries. Human capital in our model provides the link between tastes and endowments that is missing in the standard trade models. Because countries tend to be good at producing goods similar to the ones they prefer to consume, countries with very different stocks of human capital do not trade in our model, unlike in the standard model.

To illustrate this idea, consider the case of cars. As the failure of Yugos and Ladas in the West illustrates, Westerners do not want East European cars even at low prices. East Europeans clearly do not have a comparative advantage at cars. But why don't Western countries make inferior versions of their own cars at home and export them to Eastern Europe? The point is that they would be too expensive for most people in Eastern Europe and Russia. For example, Volkswagen probably cannot offer even the simplest car made in Germany for less than \$5000. In 1994, this amounted to 10 years income for an average Russian worker. Some Russians can surely afford VWs or even BMWs, but there are not many of them. The point is that new Western cars are too expensive for virtually all Russians, who cannot afford such luxuries. Eastern and Western Europe are too different for either to export many new cars to the other, a result that poses a problem for the standard trade model.

More generally, because countries are good at producing the quality not far from the one they demand, similar countries trade more with each other than very different countries, as suggested by Linder (1961). Linder's result that similar countries trade more with each other has been derived by Markusen (1986), who argued that richer countries produce capital-intensive goods, but also demand capital-intensive goods because these goods have more than unit-elastic income elasticity. Our model is related to Markusen's, but stresses quality rather than

capital intensity of goods, as well as human rather than physical capital. In fact, there is considerable empirical evidence from surveys of individual plants that worker skills, more than the quantity or even quality of capital, determine plant productivity (e.g. Daly et al., 1985). Linder's model has also been tested by a large number of scholars, with mixed results (see papers in Vernon, 1970 and the survey by Deardorff, 1984).

An extensive literature in price theory in general and trade theory in particular looks at the quality of goods. The hedonic approach of Lancaster (1966) assumes perfect substitutability between quality and quantity of a good, so only the product of quantity and quality enters utility. Taken literally, this means that a wealthy German would be indifferent between driving ten Ladas and one BMW. Our key assumption, in contrast, is imperfect substitutability between quality and quantity, so that the wealthy German wants only one good car rather than many bad ones and a poor Russian wants a low quality car rather than a German car 1 day a month. This assumption drives our main conclusion that very different countries may not trade.

Since Vernon (1966), the role of product quality in international trade has been extensively studied. Stokey (1991a) presents a model of trade with many qualities of goods, but in her model consumers in the rich North consume more of the same goods as consumers in the poor South, not different goods. Flam and Helpman (1987) present a model of trade with many qualities of goods, and also discuss the effect of income distribution on trade, but they do not discuss the issue of breakdown of trade because of differences in demand. A large literature on inter-industry trade (Helpman and Krugman, 1985) focuses on increasing returns as the motive for trade, and explains why rich countries trade more with each other than with poor countries. These models, however, do not generally focus on differences in demand patterns. Most recent work in this area includes Grossman and Helpman (1991a,b), Stokey (1991b) and Young (1991). None of these studies, however, focuses on the breakdown of trade.

In Section 2, we set out a simple model of human capital and trade. In Section 3, we describe autarky. Section 4 presents our main results. Section 5 discusses trade under alternative assumptions, and shows why more trade may emerge than our model suggests. Section 6 briefly discusses the relevance of the model for international income comparisons. Section 7 concludes.

## **2. A simple model**

### *2.1. Preferences and endowments*

There are two types of goods in the economy. One is goods for which quality is important such as cars, radios, TVs, stereos, clothes and other consumer manufac-

tures. The second is goods for which quality does not so much depend on the quality of labor in the country, such as grain, or simple intermediate goods such as steel. We assume that there is one good for which quality matters, and one good for which it does not. The latter good is taken to be numeraire.

We assume that the representative consumer in each country wants exactly one unit of the quality good. People do not want more than one car, TV or stereo; they want better cars, better TVs and better stereos. Our analysis does not require complete satiation with quantity; only that the tradeoff between quality and quantity for quality goods be imperfect. The utility function is given by:

$$\log(Q) + m \cdot \log(X) \quad (1)$$

where  $Q$  is quality of the quality good, and  $X$  is the quantity of the numeraire good. We assume that a person can only consume one quality of the quality good and cannot mix qualities. One cannot drive a BMW 5% of the time and a Lada the rest. The quality  $Q$  cannot be interpreted as the average quality consumed in a country.

Each country is endowed with  $L = 1$  unit of labor. However, the quality of that labor, which we call human capital of the country, is given by  $H_W$  in one country and  $H_E$  in the other, where  $H_W > H_E$ . Since we are interested in describing trade patterns rather than growth, we take the levels of human capital to be exogenous. There is no physical capital in the model.

## 2.2. Technology

The production function for good  $X$  is given by

$$X = H \cdot L_X \quad (2)$$

where  $L_X$  is labor devoted to the production of  $X$ , and  $H$  is the country's human capital. Countries with better labor produce proportionately more  $X$  with the same time input.

To make 1 unit of the good of quality  $Q$ , a country with human capital  $H$  requires

$$L_Q = g(Q/H) \quad (3)$$

units of labor, where  $g$  is the labor requirement function. The higher the human capital, the lower is the labor requirement to produce a unit of a given quality. We assume that the production function for the quality good is constant returns to scale in *quantity*, so to produce twice as many units of a given quality requires twice as much labor of a given quality. This assumption enables us to look at a perfectly competitive model.

Let  $C(Q|H)$  be the cost in terms of foregone  $X$  of producing 1 unit of the good of quality  $Q$  in a country with human capital  $H$ . Then from Eqs. (2) and (3) we have that

$$C(Q|H) = Hg(Q/H) \quad (4)$$

The *average* cost of a unit of output per unit of *quality* in terms of foregone numeraire  $X$ , which we refer to as *the average cost of quality*, is given by:

$$AC(Q|H) = C(Q|H)/Q = Hg(Q/H)/Q = g(Q/H)/(Q/H) \quad (5)$$

where the first equality is the definition of average cost of quality and the second equality follows from Eq. (4). This average cost of quality curve describes the production side. Since we assume constant returns to scale, the conventional average cost curve in terms of quantity is a constant.

We make the key assumption that the average cost of quality curve is U-shaped: for a given  $H$ , there is a quality level for which the average cost of quality Eq. (5) is minimized. This amounts to assuming that for each level of human capital there is a level of quality which the country with this human capital is 'best' at, which increases with  $H$ . Denote this quality level at  $H = 1$  by  $\hat{Q}$  and the average cost of  $\hat{Q}$  by  $\hat{C}$ . Then from Eq. (5), for a country with human capital  $H$ , the quality at which the average cost of quality is minimized is  $H \cdot \hat{Q}$ , and the average cost at that quality is equal to  $\hat{C}$ . Higher human capital countries are the most efficient at producing higher quality levels. The U-shaped average cost of quality curve builds in our key assumption: as a country's human capital rises, its comparative advantage in *lower* quality goods relative to  $X$  falls while its comparative advantage in higher quality goods relative to  $X$  stays constant. West Germany is not very good at making bad cars relative to good cars or to grain.

The potentially controversial assumption is that West does not have a comparative advantage at making low quality goods relative to  $X$ . This assumption seems empirically plausible, since we do not observe Western countries making low quality machine tools, tractors, cars, or optical equipment. One way to think of this assumption is in terms of technological progress. As a country's technology (as measured by  $H$ ) improves, the higher technology expresses itself as higher output per unit of labor for some goods (we call them  $X$ -goods) and higher quality per unit of labor for other goods (we call them quality goods). For the latter goods, the labor requirements in producing a unit of output are not significantly smaller in a high- $H$  country, and hence it has a comparative disadvantage at low quality goods relative to high quality goods and to  $X$ . Essentially, this argument relies on a specific production function for quality goods, in which producing a unit of even the lowest quality requires a certain minimum number of workers. After that, upgrading quality requires more workers, and the returns in terms of extra quality from adding more labor are diminishing. Germany requires a certain minimum amount of labor to make even the simplest car, which gives it a comparative disadvantage at such cars.

Fig. 1 presents the average cost curves of quality for different levels of  $H$ . If

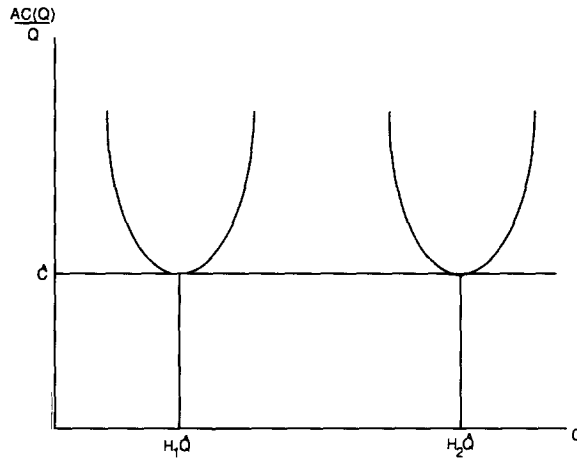


Fig. 1. Average cost curves.

countries with all human capital levels existed, then the supply curve of quality would be horizontal at the level  $\hat{C}$ , since for each quality level there would be a country that can produce that quality at the average cost of  $\hat{C}$ . The horizontal line at  $\hat{C}$  is the locus of minimum average costs per unit of quality, just like in the standard long run/short run average cost analysis.

In our model, we simply assume that there is a variable  $H$ , such that countries with more  $H$  want higher quality goods but also have a comparative advantage at making them. As a result, tastes and capabilities are correlated. When  $H$  is interpreted as general human capital, this correlation is quite natural. People with more human capital are more knowledgeable, which enables them to produce more advanced products, but also makes them richer and interested in consuming more advanced products. An alternative way to proceed would be to derive the relationship between tastes and capabilities from more basic principles. For example, people in countries with more  $H$  are richer and demand higher quality goods; as a result, they choose to specialize in producing higher quality goods. This formulation would be consistent with the Linder (1961) discussion, and with more recent trade theory (Helpman and Krugman, 1985). Incorporating this formulation into our analysis would make it more complicated, but would probably generate similar results. We have chosen to stick to the basic trade theory formulation of taking endowments as given (Jones and Neary, 1984), since our main interest is in trade patterns rather than in the acquisition of skills.

### 3. Autarky

In autarky, one unit of the quality good is produced, and the labor used is  $L_Q$  given by Eq. (3). In equilibrium, it must be the case that in each country

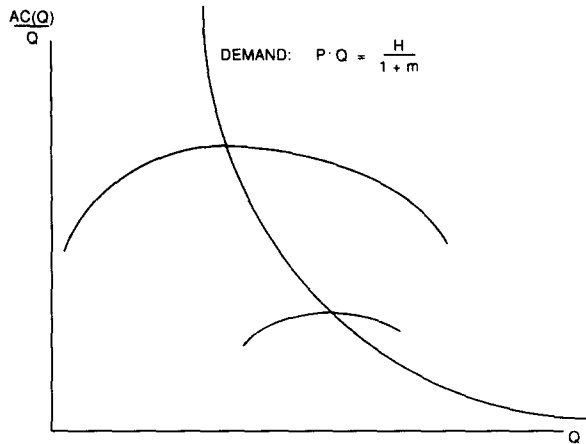


Fig. 2. Indifference curves and demand.

$L_x + L_Q = 1$ . The question is what quality is produced in a country with human capital  $H$ ?

Consider the indifference curves between quality and price for the quality good in Fig. 2. At a fixed price per unit of quality  $P$ , the consumer would pick some optimal quality at which his expenditure on quality  $P \cdot Q$  is equal to his ideal expenditure  $H/(1 + m)$ . Both higher and lower qualities are less attractive yielding the shape of the indifference curves in Fig. 2. The locus of preferred qualities at each price defines the consumer's unit elastic locus of preferred qualities at each given price per unit of quality, where the total preferred expenditure on quality is  $H/(1 + m)$ . We loosely refer to this curve as 'demand' for quality.

If all the qualities were available at the unit cost of quality  $\hat{C}$ , the representative consumer in a country with human capital  $H$  would pick the quality  $Q$  at the intersection of his demand curve and the unit cost curve  $\hat{C}$ , as in Fig. 3:

$$Q(H) = \frac{H}{(1 + m)C} \tag{6}$$

The country might be so lucky that the quality of which it is the lowest cost producer is exactly equal to the quality  $Q(H)$  that it wants to consume. But this only occurs by coincidence.

In general, the two qualities need not be equal. We assume that the quality that a country would most prefer to consume at the unit price  $\hat{C}$  exceeds the quality that the country is most efficient at producing:

$$Q(H) > \hat{Q} \cdot H \tag{7}$$

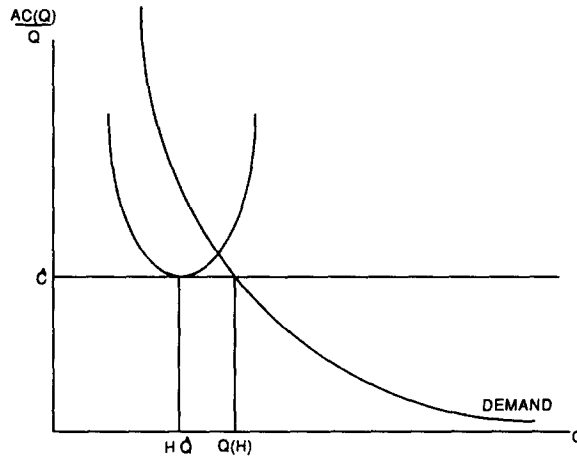


Fig. 3. Consumers prefer to upgrade quality relative to capabilities.

which is the same as

$$\frac{1}{1+m} > \hat{C} \cdot \hat{Q} \quad (8)$$

This assumption is illustrated in Fig. 3. The optimal expenditure share on quality is higher than the country would spend if it consumed the quality it is best at producing. This assumption says that people would like to upgrade quality relative to what they can produce most efficiently. Assumption Eq. (8) gives countries the reason to trade to upgrade quality in exchange for  $X$ . Our analysis could also be applied to countries that want to downgrade quality (see Footnote 2).

As Fig. 3 illustrates, in autarky the country in general does not produce the quality  $Q(H)$  at the lowest unit cost of quality  $\hat{C}$ , since the unit cost of  $Q(H)$  is too high. The autarkic equilibrium is given by the tangency between the consumer's indifference curve and the country's average cost curve of quality (Fig. 4). At this point, the quality produced in the country is given by  $Q_a$  and the average cost of that quality is  $C_a$ . The consumer cannot improve his welfare given the country's productive opportunities.

Under assumption Eq. (7), the quality in autarky  $Q_a$  is higher than the quality  $\hat{Q} \cdot H$  that the country can produce most efficiently, and therefore the unit cost of quality in autarky is also higher. The expenditure share on quality goods, however, is still below  $1/(1+m)$ , since the tangency occurs below the maximum point of the indifference curve. Consumers are better off than they would be if the country produced the quality at which it is the most efficient, but worse off than they would be if they could consume a higher quality at the minimum cost of quality  $\hat{C}$ . This analysis illustrates the problem with autarky and the potential gains from trade. The population in a country would like to consume higher quality goods



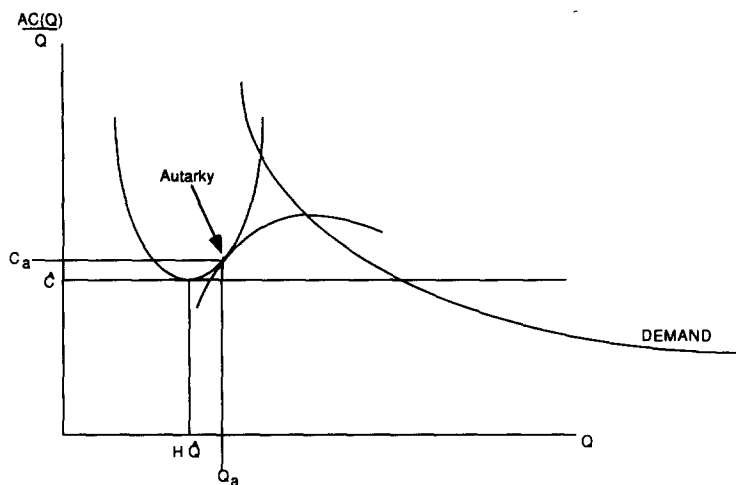


Fig. 4. Autarky.

than they can make efficiently, but this is too expensive in a closed economy. As a result, the country ends up producing a level at which it is not an efficient producer. International trade enables such a country to upgrade its quality by purchasing it from a more efficient producer.

#### 4. Trade

In this section we allow trade between the two countries, West and East, with human capital levels  $H_W$  and  $H_E$ , respectively, such that  $H_W > H_E$ . By assumption Eq. (8), each country in autarky produces a higher quality than it is most efficient at, but a lower quality than it would choose to consume at the unit cost of quality  $\hat{C}$ . Will these two countries trade and how?

East and West trade if they are not too far from each other, that is if  $H_W$  is not too much higher than  $H_E$ . If  $H_W$  is only moderately higher than  $H_E$ , then East can upgrade its quality by exporting  $X$  to West in exchange for the higher quality goods. West (the exporter of quality goods) produces a higher quality for itself, a lower quality for East, as well as possibly some  $X$ . East stops producing quality goods altogether and just specializes in producing  $X$  for export and imports quality goods from West. East is thus able to upgrade its quality indirectly by producing and exporting  $X$ , rather than by making higher quality goods domestically.

Fig. 5 illustrates how trade takes place in this model in an equilibrium where West continues to produce some  $X$  for itself. East imports the quality  $Q_1 > Q_a$  from West at a price given by West's average cost of quality  $Q_1$  in terms of  $X$ .

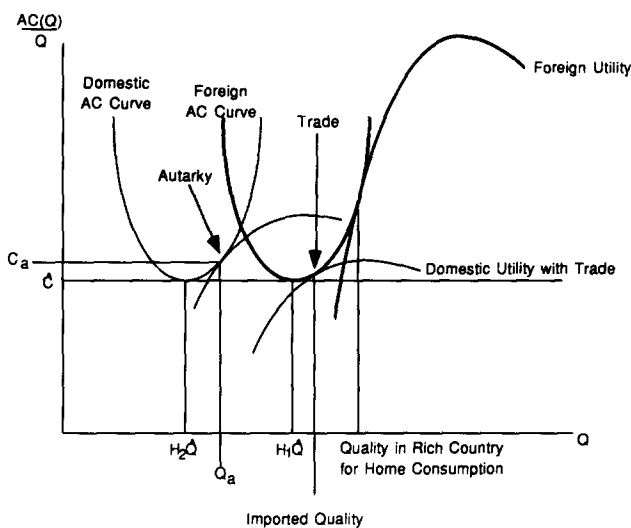


Fig. 5. Trade.

The per unit cost of that quality,  $C_1$ , is below  $C_a$ . As long as West produces  $X$  in equilibrium, all the gains from trade in this model accrue to East, the importer of quality, because the supply of goods from West is perfectly elastic. West just gets its  $X$  for exactly the opportunity cost of producing the quality  $Q_1$  for East, rather than  $X$  directly. West continues to produce its own high quality for itself; it reduces the production of  $X$  and imports  $X$  in exchange for the quality goods it exports. For West, exports of quality goods are an indirect way to obtain  $X$  for its own consumption.

The ideal trading partner for East is the most efficient producer of the quality that East's citizens most prefer to consume. This ideal partner produces the quality  $\hat{Q} \cdot H_w = Q(H_E)$  and sells it to East at its unit cost of quality  $\hat{C}$ . In general, unless all qualities are available, East will not be able to obtain its ideal quality. Nonetheless, it can upgrade some of the way and there are gains from trade. These gains from trade rise initially as  $H_w$  rises from  $H_E$  since the quality that East buys becomes closer to the ideal. This is the case in Fig. 5. When  $\hat{Q} \cdot H_w = Q(H_E)$ , gains from trade are maximized. As  $H_w$  rises further, gains from trade fall but remain positive even though the consumers in East are now getting higher quality than they would ideally prefer. A consumer from East spends more than its most preferred share of income on buying quality goods, and would like to downgrade its quality, but cannot. Still, trade is better than autarky.

Gains from trade are positive as long as Western goods are not of too high a quality. If Western goods are of excessively high quality, then the amount of  $X$  that East must give up in exchange for that quality is just too high to make trade

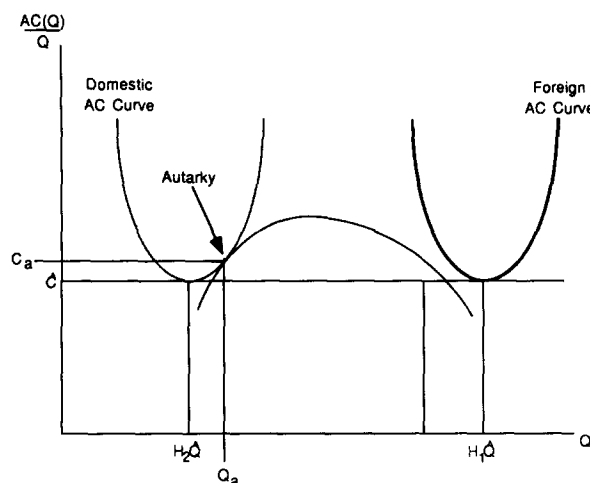


Fig. 6. No trade.

worthwhile. As  $H_W$  rises, West loses its comparative advantage at lower quality goods relative to  $X$ . The qualities that East's citizens would like to import are no longer cheap, and the qualities that are relatively cheap are too good for East's citizens. In this case, the equilibrium exhibits no trade, as illustrated in Fig. 6.<sup>2</sup>

Before the two countries are too different for them to trade, there is an intermediate range, in which East's citizens sell some amount of  $X$  in exchange for some probability of getting a higher quality good. One can think of this as a lottery for a car, in which many people from East chip in some small amount of  $X$  each and with some probability one of them gets a good car. They are too poor for any one of them to buy this car, but are willing to participate in a lottery. This lottery is just a technicality in our model. With many quality goods, in this intermediate equilibrium there is trade and quality upgrading of some but not all goods. With only one quality good, the equivalent of trade to upgrade a subset of the goods is the lottery. As countries become too different, even the lottery becomes unattractive and there is no trade in equilibrium. Thus a lottery is not a mechanism by which trade between very different countries can take place.

In the above discussion, we have effectively maintained an empirically plausible assumption that West's economy is large enough relative to that of East that

<sup>2</sup> If assumption Eq. (8) is reversed, and countries want to downgrade their quality, then in equilibrium, as long as East and West are close enough together, they still trade. East produces two qualities, a low one for itself and a high one for West, and exports the latter in exchange for  $X$ . However, when East and West are far enough apart in their levels of  $H$ , they again do not trade. We do not find this case to be particularly plausible empirically.

West can produce quality goods for itself and East, and still keep producing some  $X$ . This assumption in particular gives us the result that all the gains from trade accrue to East. We can alternatively assume that West runs out of labor before it can produce all the quality goods, and hence stops producing  $X$ . In this equilibrium, West produces two qualities of the quality good, and exports the lower quality to East in exchange for  $X$ . East produces  $X$  for both its own and West's consumption, as well as some of the quality good of a lower quality than it imports. East's consumers are indifferent between the lower priced domestically produced quality goods and higher priced imported quality goods of a higher quality. In this equilibrium, gains from trade accrue to West because East is paying for the quality good exactly what it costs to produce it domestically (quality adjusted). In our Ricardian model, we have the result that, in equilibrium, the country that produces and imports the same good receives no gains from trade.

To summarize the main result, unlike in the standard Ricardian or Heckscher–Ohlin setup, tastes and endowments in our model are correlated. Countries with low (high) endowments of human capital prefer to consume fairly low (high) quality goods, which they themselves have a comparative advantage at making, and hence might not trade with countries very different from themselves. Imperfect substitutability between quality and quantity generates the preference of consumers in each country for a particular quantity/quality combination, and thus enables us to get results which would not be obtained in the standard hedonic model in Lancaster (1966). Indeed, if there was perfect substitutability between quality and quantity, West would always import large amounts of low quality good from East at low prices in exchange for  $X$ , just as the Heckscher–Ohlin model (implausibly) predicts. In contrast, when quality and quantity are not substitutable, the coincidence of wants and capabilities leads to the Linder effect in our model. Very similar countries have a low volume of trade with each other because they make very similar goods (ignoring intra-industry trade), and very different countries have a low volume of trade because they demand very different goods. The volume of trade is the largest for some intermediate difference in human capital endowments between the two countries.

## 5. Extensions

### 5.1. Trade under alternative assumptions

As we specified the model, trade does not take place between very different countries because rich countries do not have a comparative advantage in lower quality goods relative to good  $X$ , such as steel or grain. We have kept constant the relative efficiency in the production of high quality goods and  $X$ . But sometimes rich countries gain a comparative advantage in  $X$  relative to quality goods in

general. For example, the US has enormous comparative advantage in grain. In this case, trade between East and West is even less likely because the amount of  $X$  that West has to give up to trade is even higher. The average cost curve shifts up as it moves to the right, making autarky more likely for any given pair of human capital endowments. Put differently, if countries become better in  $X$  relative to high quality goods as  $H$  rises, the price they will pay for  $X$  in exchange for lower quality goods falls, and therefore exporting  $X$  goods will be even less attractive to East. In this respect, we have underestimated the likelihood of autarky when rich countries have comparative advantage in non-quality goods.

The opposite case is that of natural resources. The key aspect of these goods is that a country does not become significantly better at producing them in terms of time inputs as human capital rises, and as a result loses its comparative advantage at producing them relative to high quality goods. Unlike in the basic model where the comparative advantage between  $X$  and quality stays constant, here the comparative advantage in  $X$  relative to quality falls. This means that the average cost of quality curve (in terms of  $X$ ) shifts down as it shifts to the right. As  $H$  rises, the amount of forgone  $X$  to produce the optimum quality falls. In this case, East and West are more likely to trade than they are in the basic model. As West becomes richer, East's comparative advantage at natural resources grows, and therefore exporting them for even high quality goods is worthwhile. So even though East might not want to give up grain or steel to get such high quality goods, it is willing to give up natural resources, which West is not as relatively good at, to obtain the high quality. Put differently, high quality goods from West are cheaper in terms of natural resources than in terms of steel.

This model predicts that countries rich in natural resources are more likely to trade with West than countries that do not have such endowments. Saudi Arabia, Russia and Brazil might be perfectly able to exchange their endowments for relatively high quality foreign manufactures. On the other hand, Lithuania and Hungary do not have natural resources, and so must sell goods they are relatively bad at producing to upgrade the quality they consume.

Natural resources are only one of several examples of alternative assumptions under which our model predicts more trade than the baseline case. One can imagine several other changes in assumptions that lead to more trade. First, if East develops a capability to produce some high quality goods efficiently, by for example upgrading its labor force, it can export them to West in exchange for  $X$ . This might be a good description of how Korea and other newly industrialized countries have developed such extensive trade with rich economies, whereby they export final manufactures and import intermediate goods and raw materials. Second, East might be prepared to pay up for very high quality of some goods, such as specialized intermediate goods (machine tools, heavy equipment, airplanes). This assumption amounts to changing East's preferences. In this case, East would export  $X$  to West in exchange for some very high quality goods, and some trade would occur, although probably not very much. Third, not all

consumers need to be the same and some consumers in the East might be wealthy enough to afford high quality goods. In this case as well, East would export  $X$  and import relatively high quality goods for its wealthy. In short, the stark no trade prediction of our model depends on assumptions that might be too strong. Nonetheless, except in the cases of natural resources and human capital upgrading by East, it is hard to imagine that alternative assumptions would lead to a lot of trade.

### 5.2. Trade with multiple countries

We have dealt with the case of two countries. With more countries, we can imagine chains of trade. An intermediate country exports moderate quality goods and imports  $X$ , but then turns around and imports high quality goods from a rich country and exports  $X$  to that country. More generally, each country, if it trades, imports quality goods from its best available trading partner, meaning the one whose most efficient quality is closest to the country's ideal quality demanded. Sometimes that might not be the country with the level of human capital closest to that country, since gains from trade with the closest country might be lower than gains from trade with a country that is further away.

With chains of trade,  $X$ -goods from a poor country can reach a rich country. Lithuania might sell grain to Poland in exchange for cheap cars, which exchanges that grain with Germany for better cars. Although Lithuanian grain reaches Germany, good cars do not reach Lithuania, and so, effectively, the two countries still do not trade. Such chains of trade are consistent with our main point, namely that the gains from trade between Lithuania and Germany are small.

## 6. Comparison of living standards

Scholars comparing living standards across countries have long recognized the importance of quality of goods, and incorporated it into their comparisons (e.g. Kravis et al., 1978). Theoretically, however, the case for quality adjustments has been most clear for services, which are non-traded by assumption. Our model clarifies the reason for making quality adjustments of potentially tradeable goods. In our model, low quality goods unlike services *can* be traded, but are not traded *in equilibrium*. In equilibrium, therefore, they are just like services. They are cheap in poor countries relative to wages, and a real income comparison that does not adjust for quality does not fully reflect that. Put differently, people in rich countries would not pay much for these goods, but they are worth significantly more to people in poor countries. In Russia, for example, wages at equilibrium exchange rates are under \$1 per hour in 1994, which was not an accurate reflection of poverty in Russia.

## 7. Conclusion

This paper has presented a Ricardian model in which countries at very different stages of economic development may not trade in equilibrium. The analysis has several plausible implications, particularly in the context of trade between Eastern and Western Europe, and perhaps trade between rich and poor countries more generally. In conclusion, we stress that our analysis may bear more generally on when people with different endowments trade with each other. For example, within a country, the rich might not want to consume the goods that the poor produce, leading to significant inequality. Here as well, differences between agents do not imply large gains from trade.

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