"From Each According to Their Ability, to Everyone – Equally:" Free Trade Theory and the Marxist Slogan Have Much in Common

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Abstract

The main models of international economics categorically assert that free trade benefits all countries, including underdeveloped ones. However, these models are based on assumptions that are totally inadequate for the technological era: the equivalence of highly skilled labor, which also utilizes the most advanced technologies, and unskilled labor, which uses primitive tools and produces Stone Age products. This paper once again examines the most fundamental of all models of international trade: Ricardo's theory of comparative advantage. An extremely instructive example of "proof" of the benefits of free trade for all participants is analyzed, based on complete disregard for the difference in highly skilled and low-skilled labor. It is shown that the universal equivalence of unit of labor is a necessary condition for the mutual benefit of free trade in Ricardo's model. If the value of a unit of labor is differentiated by the qualifications of the workforce, then trade liberalization leads to a decrease in the well-being of the country specializing in primitive types of economic activity.

Key words: Vanek-Reinert effect, free trade, macroeconomic effects of globalization

Introduction

The first World Bank consultants to arrive in Estonia in the early 1990s recommended that it close all its universities. In the future, they explained, Estonia, under free trade with developed countries, would have a comparative advantage in economic activities that would not require a university education.[1] Despite the comic absurdity of this recommendation, modern economists are indeed acting like deer in the headlights when it comes to free trade. The conviction of most of the world economic community that there is no alternative to free trade is based on the standard model that emerged in the nineteenth and early twentieth centuries,[2,3,4,5] and that is based on assumptions that are completely inadequate for the twenty-first century. This model assumes that technology is the same everywhere in the world, all countries have equal and immediate access to the most cutting-edge scientific advances, and every worker's productivity within every one country is the same, regardless of education, industry, or geography.

In our previous publications, we have shown using simple numerical illustrations that if any of these conditions are not met, then free trade may produce winners and losers, and free trade does not always benefit all participants.[6,7].

This paper revisits the most iconic model of international trade – Ricardo's theory of comparative advantage. The formal "proof" that in Ricardo's model, both participants win under free trade, given in the main textbooks of international economics, is very instructive.[8] The two types of traded goods are "wine" and "cheese," which obviously implies their qualitative equivalence. Such qualitative equivalence is applicable to the nineteenth century, or for the exchange of high-technology goods between countries with the same level of development. However, when considering trade between underdeveloped and industrial countries, the assumption of equivalence of traded goods is totally inadequate. The main export products of underdeveloped countries, such as Russia, Eastern Europe, and South America, are primitive goods and raw materials. In this regard, for the analysis of modern trade between two types of countries, the only appropriate division of goods into types can only be "advanced" and "primitive."

In the classical Ricardian model, following the introduction of identical types of goods, there follows the postulate that the only factor of production – labor – is equal in both industries. And can move freely from one industry to another. Accordingly, wages in the two industries cannot differ. From these postulates it does indeed follow that both participating economies benefit from

free trade, specializing only in the goods in which each country, accordingly, has a comparative advantage.

In trade between developed and underdeveloped countries, not only considering only similar goods is inadequate, but also it is inadequate to assume that labor is equivalent and that workers can move freely from primitive industries to high-tech ones. Labor in the twenty-first century is clearly divided into highly skilled, used in the development and production of high-tech goods, and low-skilled, used, for example, in agriculture, mining, or, importantly for underdeveloped countries, final assembly of manufactured goods from imported components.

In this paper, the Ricardian model is considered in the context of trade between underdeveloped and developed countries. The two types of goods are primitive and high-tech goods, and labor can be low-skilled or high-skilled. It is shown that equality of labor productivity and complete interchangeability of unskilled and skilled labor is a necessary condition for conclusions about the mutual benefit of free trade. In the case where the contribution of highly skilled labor to the welfare of the country is higher than the contribution of low-skilled labor, the welfare of the underdeveloped country decreases with the liberalization of trade and specialization in primitive economic activities.

Results

Ricardo's comparative advantage principle

Consider the simplest illustration of the Ricardo's model, adapted to the realities of the 21st century. Two countries (industrial – the USA, and underdeveloped – Russia) produce two types of goods – high-tech (laptops) and primitive (chairs). Each country has 500 workers who are employed in the two industries as follows:

Products	American workers	American output	Russian workers	Russian output	World output
Chairs	200	100,000	200	80,000	180,000
Laptop PCs	300	60,000	300	18,000	78,000

In this example, the Russian high-technology industry is relatively less developed than the American — American workers are more than three times as efficient at producing laptop PCs than Russian workers, while the difference in efficiency in labor-intensive commodity goods (chairs) is much less pronounced.

After specialization, the world output of both computer laptops and chairs increases.

Products	American workers	American output	Russian workers	Russian output	World output
Chairs	0	0	500	200,000	200,000
Laptop PCs	500	100,000	0	0	100,000

Now, assume that the value of a PC is $1000, while the value of a chair is $100.

Before specialization, the output is as follows:

Products	American workers	American output	Russian workers	Russian output
Chairs	200	$10,000,000	200	$8,000,000
Laptop PCs	300	$60,000,000	300	$18,000,000
Total	500	$70,000,000	500	$26,000,000

Now, the world output after specialization under the assumption of a $1000 laptop and a $100 chair:

Products	American workers	American output	Russian workers	Russian output
Chairs	0	$0	500	$20,000,000
Laptop PCs	500	$100,000,000	0	$0
Total	500	$100,000,000	500	$20,000,000

While the world output increases both in production and in dollars, the American output increases disproportionately, from $70 million to $100 million per year due to specialization in high-technology products, while the Russian dollar output *decreases* from $26 million to $20 million due to the loss of the high-technology industry.

This example shows how an underdeveloped country immediately loses out as a result of opening up markets. However, the mainstream of the world economic thought is adamant – this scenario is impossible! Free trade is beneficial to all participants!

Experts in the field of international trade theory, for example, devote several whole sections in their book to lecturing those who are "misguided" in their arguments against free trade.[8] Paul Krugman and his co-authors provide a very instructive argument that in the Ricardian model, both countries gain by specializing only in what they have a comparative advantage in.

The key assumption of their proof is the following. Using the relative prices of two types of goods and the relative amount of labor in both countries required to produce these goods, they postulate that the relative price (in our example) of a chair and a laptop cannot be less than the relative amount of labor required to produce them. Why? If a chair is much cheaper than a laptop, then no one will waste their time on making furniture, and everyone will rush into producing electronics. That is, if making a chair takes, for example, one working day of one person, and a laptop takes five days, then the cost of the chair cannot be less than 1/5 of the cost of the laptop. Because otherwise, work in the furniture industry would have to be done for a

lower hourly rate of pay than in electronics, and all carpenters would immediately get their PhDs in engineering and move to high-tech industries.

Further, as the proof goes, by the definition of comparative advantage and under our assumption that the United States has a comparative advantage in electronics, the relative labor cost of producing one laptop in the United States is less than the labor cost of producing five (as in Russia) chairs. Accordingly, the relative price of a laptop in the United States is less than the price of five chairs. With such a price ratio, the supporters of the Ricardo model claim, Russian electronics engineers should scrap all their (inefficient) equipment, close all universities, grab carpentry tools, and go into the furniture industry. After all, the consultants from the Washington Consensus tell us, that instead of spending five workdays on producing a laptop, a Russian engineer can make five chairs in that time. And these five chairs can always be exchanged for more than one laptop in the United States, by the assumptions about comparative advantage. For this reason, the Washington Consensus economists conclude, the effect of free trade for Russia is positive.

Note that the requirement of equivalence and interchangeability of low-skilled and highly skilled labor is, from a mathematical point of view, a necessary condition for mutually beneficial trade between two countries with different levels of development. If this condition is not met, that is, if highly skilled personnel are more valuable to the economy than unskilled workers, it is no longer possible to conclude that free trade is mutually beneficial.

Formal consideration

Theorem

For free trade in the Ricardian model to be mutually beneficial, a necessary condition is the equivalence and complete interchangeability of low-skilled and highly skilled labor within each country.

Proof

Suppose that highly skilled labor is more valuable than low-skilled labor, and that the rewards of highly skilled workers are correspondingly higher than those of low-skilled workers. We will show that in this case there is a range of relative prices and a range of relative labor hours for which the welfare of the country with a comparative advantage in low-skilled labor is decreased by trade liberalization.

Denote unit labor requirements in goods production by a_L. Subscript A will be used for advanced goods, subscript P for primitive goods. Price is, as always, denoted by capital P. The two countries in our model are Home and Foreign. Foreign parameters will be denoted by an asterisk. For example, the notation for the number of units of labor required to produce one unit of advanced goods in Foreign is a_{LA}^*; the notation for the number of units of labor required to produce one unit of primitive goods in Home is a_{LP}.

Under our assumptions, Foreign has a comparative advantage in advanced goods production:

$$\frac{a_{LP}}{a_{LA}} < \frac{a_{LP}^*}{a_{LA}^*}$$

If the unit of low-skilled labor is equivalent to (and fully interchangeable with), including in terms of expected reward, the unit of skilled labor, then the ratio of prices of primitive and high-tech goods P_P/P_A cannot be lower than the ratio of unit labor requirements in production of primitive and advanced goods in Home a_{LP}/a_{LA}. And if each country specializes in one type of goods,

$$\frac{P_P}{P_A} > \frac{a_{LP}}{a_{LA}} \quad (1)$$

Now assume that Home has A_L labor hours, which we can distribute between the production of primitive and advanced goods: $A_L = A_{LP} + A_{LA}$. Next, we can produce either both types of goods, or only the primitive ones, exchanging some of them for advanced-goods imports. If we produce both types of goods, then our production and consumption are:

$$\frac{A_{LP}}{a_{LP}}P_P + \frac{A_{LA}}{a_{LA}}P_A = \frac{A_L - A_{LA}}{a_{LP}}P_P + \frac{A_{LA}}{a_{LA}}P_A = \frac{A_L}{a_{LP}}P_P - A_{LA}\left(\frac{P_P}{a_{LP}} - \frac{P_A}{a_{LA}}\right) \quad (2)$$

Provided that highly skilled labor can be replaced by low-skilled labor, and accordingly the condition (1) is met, the expression in brackets is positive. As a result, maximum consumption is achieved when $A_{LA} = 0$, that is, when Home completely specializes in primitive production.

Now assume that highly skilled labor is more valuable than low-skilled labor. Each labor hour of highly skilled labor is valued $\alpha > 1$ times higher than that of unskilled labor.

Then Equation (1) becomes

$$\alpha\frac{P_P}{P_A} > \frac{a_{LP}}{a_{LA}}$$

Write the difference in brackets of equation (2) in the following form:

$$\left(\frac{P_P}{a_{LP}} - \frac{P_A}{a_{LA}}\right) = \frac{P_A}{a_{LP}}\left(\frac{P_P}{P_A} - \frac{a_{LP}}{a_{LA}}\right) = \frac{P_P}{a_{LP}}(1-\alpha) + \frac{P_A}{a_{LP}}\left(\alpha\frac{P_P}{P_A} - \frac{a_{LP}}{a_{LA}}\right)$$

Substituting this expression into Equation (2), we obtain:

$$\frac{A_L}{a_{LP}}P_P - A_{LA}\left(\frac{P_P}{a_{LP}} - \frac{P_A}{a_{LA}}\right) = \frac{A_L}{a_{LP}}P_P - A_{LA}\left[\frac{P_A}{a_{LP}}\left(\alpha\frac{P_P}{P_A} - \frac{a_{LP}}{a_{LA}}\right) - (\alpha-1)\frac{P_P}{a_{LP}}\right]$$

$$= \frac{A_L}{a_{LP}}P_P - \frac{A_{LA}}{a_{LP}}P_A\left[\left(\alpha\frac{P_P}{P_A} - \frac{a_{LP}}{a_{LA}}\right) - (\alpha-1)\frac{P_P}{P_A}\right] \qquad (3)$$

It is obvious that for any $\alpha > 1$ there exists a value of P_P/P_A, such that

$$(\alpha-1)\frac{P_P}{P_A} > \left(\alpha\frac{P_P}{P_A} - \frac{a_{LP}}{a_{LA}}\right)$$

In equation (3), the first term, $(A_L/a_{LP})P_P$, is the "GDP" with full specialization in primitive products. The second term is the correction to this "GDP" when part of the resources is utilized to produce advanced products. In the case of equivalence and interchangeability of low-skilled and highly skilled labor ($\alpha = 1$), this second term is always negative, and free trade and specialization are beneficial to both countries. If highly skilled labor is valued more than low-skilled labor, then $\alpha > 1$, and the difference in brackets is no longer necessarily negative. Specialization in primitive products and, accordingly, free trade is no longer always beneficial to one of the countries.

QED.

Finally, note that in our example with laptops and chairs, the price-labor ratios are as follows:

$$a_{LP} = \frac{200}{80,000} = \frac{1}{400}$$

$$a_{LA} = \frac{300}{18,000} = \frac{1}{60}$$

$$a_{LP}^* = \frac{200}{100,000} = \frac{1}{500}$$

$$a_{LA}^* = \frac{300}{60,000} = \frac{1}{200}$$

$$\frac{P_P}{P_A} = \frac{\$100}{\$1000} = \frac{1}{10}$$

$$\frac{P_P}{P_A} = \frac{1}{10} < \frac{a_{LP}}{a_{LA}} = \frac{60}{400} = \frac{1.5}{10}$$

An extremely important note on advanced and primitive goods in the international division of labor and global value chains

Contrary to what proponents of free trade make their students believe,[9] underdeveloped countries *have not* become "major exporters of manufactured goods." Overwhelmingly, underdeveloped nations' exports to advanced nations even more so now consist of relatively unsophisticated products ("low-tech goods"). To align with the Ricardian two-types of goods division of labor presented in this paper, consider the following two examples.

1. Mexico exports Ford cars to the US. What is the division of labor in this value chain and why Mexico's contribution to the production process is primitive? The US manufactures high-tech components, machinery and equipment and sends them to Mexico. In Mexico, the final labor-intensive assembly of the vehicles takes place. These assembled in Mexico from imported components vehicles are then sold in the United States. Obviously, from the engineering standpoint, the advanced part of the vehicle production is research and development, creation of new materials and precision machinery to make the product more durable and efficient. This requires tens of thousands of scientists and engineers from universities to research labs in industry, and thousands of highly skilled personnel to ensure a high-throughput mechanized production of advanced components. Final assembly, on the other hand, cannot be mechanized, and is very labor-intensive. But final assembly does not require high level of worker qualification and can be performed by workers after just a few weeks of training. Hence, the advanced part of a vehicle production occurs in the US (or in industrial countries in general), while the primitive part of the process is performed by low skilled personnel in the underdeveloped countries (Mexico in this example, and other underdeveloped nations of Eastern Europe and elsewhere in general). The underdeveloped countries, therefore, export a product of unskilled labor to the developed world rather than "manufactured goods." In the notation adopted in this paper, a_{LA}^* is the amount of (advanced) labor (including research and development) required in the US for (mechanized) production of advanced components for one vehicle; a_{LP} is the amount of (primitive) low-skilled labor in Mexico required for the final assembly of one vehicle from imported components.

2. Poland exports German dishwashers to the European Union.[10] Germany manufactures high-tech components, machinery and equipment and sends them to Poland. In Poland,

the final labor-intensive assembly of the dishwashers takes place. These assembled in Poland from imported components dishwashers are then sold in the European Union and throughout the world. In our notation, a_{LA}^* is the amount of (advanced) labor (including research and development) required in Germany for (mechanized) production of advanced components for one dishwasher; a_{LP} is the amount of (primitive) low-skilled labor in Poland required for the final assembly of one dishwasher from imported components.

From everyone – according to their ability, to everyone – equally?

In the classical Ricardo model, labor is not differentiated, but the entire modern world is based on inventions and innovations, and accordingly on the higher reward for highly skilled labor. Hence, a dilemma arises. Is Ricardo's model adequate for today, or should it be considered only in the context of a historical artifact? The question of how the idea of innovation as an engine of economic development and the complete equivalence of any type of labor activity reconcile has never occurred to Western scientists. In his paper "Ricardo's Difficult Idea"[11] Paul Krugman considers several issues related to international trade. Of course, he examines them from the point of view of the advantages of a developed country. How giving up high technology and specializing in primitive production favors the economic development of third world countries is not considered at all in this work. At the end of his paper, he concludes:

> *Ricardo's idea is truly, madly, deeply difficult. But it is also utterly true, immensely sophisticated – and extremely relevant to the modern world.*

So first to prove the mutual benefit of free trade, Krugman et al. postulate the assumption of the equivalence of all types of labor.[8] No reward for innovation? From each according to his ability, to all equally? Didn't the world economic community conclude that planned economies guided by this principle in the Communist countries were inefficient? And now we come to the conclusion that Ricardo's model is "extremely appropriate in today's world." Paradigm shift without a clutch!

Can free trade with the developed world be beneficial for primitive economies?

In certain situations, it is possible, of course, that the value of natural resources (or the per capita income from natural resource exports) is so high that the welfare of workers would indeed be higher if the entire country were engaged only in mining, and even imported the equipment for extracting raw materials from abroad. However, it is very important to consider not only the

immediate results, but also the long-term effect of abandoning domestic technology in favor of primitive economic activity.

> *Free trade theory is concerned with the efficiency of using existing resources in the short run, not with increasing existing resources in the long run. Contrary to what its proponents would have us believe, it does not claim that free trade promotes economic development.*[12]

A note on resource availability

In our treatment of the Ricardian model, we argue that from the point of view of an underdeveloped economy (Russia), the production of high-tech goods is limited by the fact that carpenters cannot immediately become highly skilled electronics workers. At the same time, in the final specialization, we assume that the industrial economy (the USA) has completely switched to the production of high-tech products. However, there is no contradiction in this if we view "USA" in our table as the entire developed world. Increasing the production of electronics in the entire developed world in order to meet the demand of the relatively small market of underdeveloped economies ("Russia") will not run into any capacity limitations.

Conclusion

The scenario considered in this paper corresponds most closely to the model of premature deindustrialization of formerly developing countries.[13] These countries prior to trade liberalization possessed their own technologies (capital) which arguably were not as efficient as those in the advanced economies. After trade liberalization these countries abandoned their technologies altogether and reoriented their economies to labor-only zero-capital model. We have shown that under this scenario the benefits from free trade to underdeveloped economies are far from guaranteed. The main point is that no matter how inefficient the industry (capital) is, the output per skilled person (involved in capital creation) is higher than the output per unskilled worker. Therefore, *generally* inefficient industry is better than no industry at all.

In our model trade can bring either losses or gains to the underdeveloped economy. In situations where a country gains rather than loses from trade, it is important to understand the reasons for the gains and whether the gains are sustainable in the long run. One can argue that in Russia the consumers have benefited from shifting to raw materials exports from advanced economy in the early 2000s. This situation would correspond to the case when the price of a "chair" in our model is greater than $150. If the price of the corresponding unit of raw materials exports (i.e.

one ton of oil) is sufficiently high, then exporting raw materials instead of supporting the industry may be beneficial in the short run. However, the natural question arises – will raw materials stay expensive indefinitely? Any fall in the raw materials prices will obviously severely affect the wellbeing of the population as the country relies solely on raw-materials export income. As another example, consider Poland transitioning from an industrial country to assembly of German dishwashers from imported components.[10] The "chair" is the amount of labor required for the manual assembly of one unit of the final product. If the German owners of business are willing to pay Polish workers more than $150 for each unit of final product, Poland as an economy benefits from free trade with the EU. There is no guarantee, however, that this will always be the case. Technological progress will make any manufacturing process more efficient. As time goes on, fewer unskilled workers will be needed, and the gap between industrial and deindustrialized countries will continue to widen.

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