Peer-Reviewing the Classics

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Adam Smith (1723-1790) and David Ricardo (1772-1823) are unanimously renowned as the fathers of modern economic theory. Among their many discoveries, one that is mentioned in most international trade books is the undisputed advantage of free trade over autarchic production, where the first author focuses on the Absolute Advantage scenario while the second shows free trade as beneficial to both countries in the otherwise weaker scenario of Comparative Advantage; however, a rigorous analysis fails to confirm the findings of these two great economists, at least with respect to free trade theories. Their arguments look flawed at a theoretical level and also fail when realistic data are filled into the models. The question remains as to whether their reasoning was caused by genuine analysis or whether they were proposing opportunistic theories justifying economic and political goals belonging to imperial Britain of late 18th and early 19th centuries.
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1. Introduction

Free trade is widely accepted in economic theory as well as in business practice as the way forward to promote efficiency, reducing production costs and improving wealth of entire nations. Most international trade textbooks start off from two famous examples mentioned in Smith (1776) and Ricardo (1821) to demonstrate the advantages brought in by free commerce. The same principles are widely adopted by international institutions supervising worldwide financial stability, attempting to prevent major economic crises and lending low-interest money to countries facing difficult times. Without the ambition to discuss the merits of Smith's and Ricardo's theories, this paper highlights some inconsistencies found in the two fictitious

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examples that explained in simple terms the benefits of free trade to virtually all students in economics across the globe.

Section 2 discusses Adam Smith's Absolute Advantage model and Section 3, David Ricardo´s model. Section 4 uses real world data to disprove the two great economists' famous rosy results. Section 5 discusses the results taking into account Consumerism — a tendency of poorer countries to mimic the consuming behaviour of richer countries. Section 6 adds some criticisms of David Ricardo's Comparative Advantage theory. Finally, Section 7 concludes.

2. Absolute Advantage

Absolute Advantage in international trade was first discussed in Smith (1776), demonstrating beyond doubt the widespread benefits brought in by international commerce. This classic work, considered the founding stone of economic theory, has it as prudent behaviour for the master of a household to purchase those products and services that would be more expensive if produced at home, so that, such reasoning, holding true for a family, would be folly not applied to a great kingdom. This sounds like very good sense, and, since the 18th century, virtually all undergraduate textbooks on the topic have explained — with fictitious numbers — the logic behind Smith's famous statement. Among many examples, one explanation runs as follows (Sawyer, 2017): in a fictitious world made up of only two countries, the United States and India, and only two products, Machines and Cloth, the first country enjoys an Absolute Advantage as its workers are able to produce 5 machines per day of labour (against 2 for Indian workers) whereas Indians surpass US counterparts by 15 yards of Cloth produced per day to just 10. Under these conditions, it would be savvy for both countries to focus only on the production of which they enjoy an advantage, exporting their surplus and importing the other's product. The example is extremely simplified and relies on a few other assumptions: labour in each country is homogeneous and it is the only resource needed for production, both countries enjoy full employment and neither that nor technology is about to change in the future. In an autarchic economic model each country would only benefit from domestic production: given two workers in each country, the scenario would be as described in Table 1, where 50% of the labour

force is working in the Machine industry and the other 50% in Cloth production.

	Without Int'l Trade		
	US	India	TOTAL
Machines (Un.)	5	2	7
Cloth (yds.)	10	15	25

Table 1. Production under autarchic conditions (Absolute Advantage)

The scenario changes significantly when free trade is allowed. In such a case, 100% of the US workforce would focus on producing Machines and all Indian workers would focus on Cloth. The world production would thus increase, as shown in Table 2.

	With Int'l Trade		
	US	India	TOTAL
Machines (Un.)	10	0	10
Cloth (yds.)	0	30	30

Table 2. Production under free trade conditions (Absolute Advantage)

Both countries are missing an indispensable product but under free trade conditions it would not be a problem importing from abroad the required quantity still leaving the producing country with a surplus of 3 Machines (US) and 5 yards of Cloth (India). In this respect Adam's statement is absolutely correct: both countries get the items they do not produce and get richer in terms of units they do produce (Table 3).

	With Int'l Trade		
	US	India	TOTAL
Machines (Un.)	10	0	10
Cloth (yds.)	0	30	30
Export Machines	8	2	
Export Cloth	10	20	
Surplus Machines	3	0	
Surplus Cloth	0	5	

Table 3. Export leaves producing country with surplus (Absolute Advantage)

2.1 Taking Money Into Account

The missing point in Adam Smith's theory and in Sawyer (2017) (not to mention, most international trade textbooks) is money. Were it possible to barter 10 yards of Cloth (imported by the US) for 2 Machines imported by India, or to trade the same number of person-hours in either country, the example above would be perfectly fine but in the real world this is seldom the case. Under this fictitious example, India would be able to negotiate the deal according to quantities just described. Indeed, in a monopolistic scenario, were US citizens desirous of clothing themselves for winter, they ought to import Cloth, the only country producing which being India. India would be a price maker for Cloth and could force the US to give 2 Machines for every 10 yards of Cloth acquired, or whatever the wishes of Machine manufacturers. If, on the contrary, the US were able to charge more money for their 2 Machines than India would receive for its 10 yards of Cloth, India would end up, every working day, paying more money to the US for its 2 machines than received for its 10 yards of Cloth. The net result is that, under the scenario just described, India would impoverish itself by this scenario, day in, day out (formal demonstration of the above is provided for in Appendix A).

The discussion here is purely theoretical as the argument raised by Adam Smith and by Sawyer (2017) is theoretical. In order to translate it into practice a lot of other factors should be taken into account and this is a promising path for future research. Actually, trade balance between the two countries has been favorable to India in recent years (source: World Bank) but this does not change the fact that the US is, as far as GDP per capita ($31,621 in 2018; source: US Census Bureau), a much richer country than India ($2,010 GDP per capita in 2018; source World Bank). This is the case because (among other factors), in the US, output from the manufacturing industry attracts a higher dollar amount per worked hour than does textile output in India.

Going back to theory, let us assume that costs in the US are twice as high as in India (cost factor = 2:1), that Machines production cost is twice the production cost of Cloth, that India marks up its product by 100%, and that the US doubles its sales mark-up in relative India's (income factor = 4:2), the base price being 1 dollar for ease of calculation. Whether these numbers make sense will be discussed in

Section 3, so let us trust they do for the time being. The result of the previous import/export scenario (Table 3) would be as shown in Table 4.

Cost factor = 2 1

COSTS

	US	India
Machines (Un.)	$4.00	$2.00
Cloth (yds.)	$2.00	$1.00

Income factor = 4 2

INCOME

	US	India
Machines (Un.)	$16.00	
Cloth (yds.)		$2.00

With Int'l Trade

	US	India
Machines	$32.00	-$32.00
Cloth	-$20.00	$20.00
TOTAL $	$12.00	-$12.00

Income from Export

Table 4. Dollar profit from international trade (Absolute Advantage)

Therefore, the 2 Machines exported by the US to India generate an income of $32 whereas the 10 yards of Cloth exported by India to the US only generate $20. It could be argued that producing Machines costs more than producing Cloth but this is not an argument in international trade because production costs remain within the country and do not augment or diminish domestic wealth (only distribute it more or less justly) whereas import/export does. Adding money flow to the export less import, the US would end up by increasing its national wealth at the expenses of India.

Overall, the argument raised by Adam Smith does not look very profound in that it stops its evaluation at a very early stage of the theoretical analysis (whether, as is unknown, for lack of analysis or in support of a partisan view) while, had only a rather intuitive factor also been considered, that of money in international trade, his rosy thesis would have easily been disproved.

3. Comparative Advantage

David Ricardo assumes a less stringent condition than does Smith, namely the weaker country does not need to enjoy any Absolute Advantage with respect to its trading counterpart. Yet, as long as there exists a Comparative Advantage between the two products in one country, there is still benefit in international trade (Ricardo, 1821).

Another significant difference is that Ricardo´s example does consider prices.

	US	India
Machines (Un.)	5	1
Cloth (yds.)	15	5

Table 5. Production in presence of Comparative Advantage

The following example (Sawyer, 2017) depicts a scenario in which a country is 5 times more efficient in the production of Machines and 3 times as much in the production of Cloth, where the second country enjoys a Comparative Advantage in production of Cloth with respect of Machines, measurable as 5/3. Yet, according to Ricardo, embarking upon international trade is still beneficial for both countries. Indeed, under autarchic conditions and under the usual assumption of two workers with a 50% labour force employed in either production, the overall world output would result as shown in Table 6.

	Without Int'l Trade		
	US	India	TOTAL
Machines (Un.)	5	1	6
Cloth (yds.)	15	5	20

Table 6. Production under autarchic conditions (Comparative Advantage)

When free trade is allowed, both countries would employ their total workforce in the most productive line, namely Machines for the US and Cloth for India (as displayed in Table 7).

	With Int'l Trade		
	US	India	TOTAL
Machines (Un.)	10	0	10
Cloth (yds.)	0	10	10

Table 7. Production under free trade conditions (Comparative Advantage)

Focused production definitely increases world production of Machines (10 versus 6) but falls short in Cloth (total production would amount to 10 yards rather than 20, as in Table 6). It means that, in order to manufacture the minimum required quantity of Cloth, as in the autarchic case, the US should dedicate a fraction of its labour force to producing Cloth in order to cover for the insufficient import from India. Indeed, India can produce 10 yards of Cloth but uses only 5 for

filling its own domestic market needs. Thus, 5 yards would be available for export to the US, which requires 10 yards more to balance its production under the autarchic scenario. Since each US worker can produce 15 yards of Cloth, 2/3 of one worker's time will be required to switch to Cloth production, so diminishing Machines production by 2 / 3 * 5 = 10/3 Machines. Table 8 displays production in each country under the constraint of either's product quantity being no less than under the autarchic case,

	With Int'l Trade		
	US	India	TOTAL
Machines (Un.)	20/3	0	20/3
Cloth (yds.)	15	5	20

Table 8. Balanced production under free trade conditions (Comparative Advantage)

The complete scenario is resumed in Table 9.

		With Int'l Trade		
		US	India	TOTAL
Dedicated Production	Machines (Un.)	10	0	10
	Cloth (yds.)	0	10	10
Adjusted Production	Machines (Un.)	20/3	0	20/3
	Cloth (yds.)	15	5	20
Consumption	Int'l Trade M	17/3	1	
	Int'l Trade C	15	5	
Surplus	Extra Machines	2/3	0	
	Extra Cloth	0	0	

Table 9. Resuming Table under free trade conditions (Comparative Advantage)

Dedicated Production figures show the quantity of Machines and Cloth that could be produced with 100% labour force focusing on the most efficient product. The Adjusted Production row modifies the figures above to take into account insufficient Cloth production and some amount of US workers to balance for that. The Consumption row depicts the actual quantities available to each country in both products after international trade while the Surplus row shows the gain in production with respect to the autarchic case. It is clear that the only

country that benefits from international trade is the most industrially developed one (the US), as the other (India) achieves the same level of consumption under free trade and autarchic scenario (its surplus is zero in both products).

However, there is another subtle difference between the two countries that Ricardo failed to take into account. Let us assume that the developed country helps the developing one to grow its production industry in that good in which it is relatively most efficient: cloth, in this case. In the autarchic case, India would increase its Cloth production and the new quantity of Cloth would become the new domestic standard. That sounds like good news as Indians would enjoy more Cloth for their internal needs. In an autarchic world, if productivity in India increases, Indian citizens would enjoy more goods for their domestic consumption (i.e. they are getting richer) and that would be the end of the story. Not so in a free trade world — if Indian productivity increases, India would be able to increase Cloth export to the US, still enjoying the same level of domestic Cloth consumption as they did before the increase in productivity while receiving some extra money for the increased exported quantity; however, the US would also benefit from this since they will need to divert fewer workers from Machine to Cloth production as now more Cloth can be imported from India, and therefore US Machine production would also increase. This scenario is displayed in Table 10. Let us assume that production of Cloth in India doubles, so that the usual 2 Indian workers can now produce 10 yards of Cloth and 1 Machine (Panel A). Under the autarchic scenario that would be the total domestic production and consumption.

PANEL A — **Without Int'l Trade**

		US	India	TOTAL
Production & consumption	Machines (Un.)	5	1	6
	Cloth (yds.)	15	10	25

PANEL B — **With Int'l Trade**

		US	India	TOTAL
Dedicated Production	Machines (Un.)	10	0	10
	Cloth (yds.)	0	20	20
Adjusted Production	Machines (Un.)	8 1/3	0	8 1/3
	Cloth (yds.)	5	20	25
Consumption	Int'l Trade M	7 1/3	1	
	Int'l Trade C	15	10	
Surplus	Extra Machines	2 1/3	0	
	Extra Cloth	0	0	

Table 10. Scenario with increased Productivity in Cloth only (Comparative Advantage)

Under the free trade scenario (Panel B) both Indian workers would work on Cloth, reaching a total production of 20 yards. If the minimum requirement is to reach the same level of consumption as in the autarchic case, 1 Machine needs to be imported and the extra Cloth can be exported. The US can now import all 10 extra yards of Cloth produced by India, leaving it short of only 5 yards, while at the same time increasing their Machines production to 25/3, since only 1/3 worker will be needed to produce the 5 missing yards and the remaining 5/3 employees will only work on Machine production. The new scenario will leave India with the same level of consumption in Machines and Cloth as under autarchy plus some extra money for exporting 5 yards more of Cloth, while leaving the US with 7/3 extra Machine production. Thus, the more developed country benefits from growth of the less developed country without doing anything at all. This sounds like a free ride for the whole world. Yet, relative to the autarchic case, the ride is not so free. The US would benefit from higher Machine production without paying the cost of investment – and that is definitely a free ride. India, for its part, has to give up its extra production in exchange for extra money; it may be a good deal

but it is no free ride. If we apply the same exchange rate as in Table 9 (5 yards of Cloth for 1 Machine), India would receive 1 more Machine for the extra 5 yards of Cloth exported (a fair deal) whereas the US would end up with 4/3 more Machines in exchange for nothing – and that is a *great* deal. David Ricardo does not discuss this scenario at all.

3.1 Taking Money into Account

Once again, money shall be included into the calculation. Ricardo's example takes money into account, and that is a definitive merit compared to Adam Smith's; however, a comprehensive explanation of a realistic, yet simplified, scenario is still insufficient. Using the example depicted in Table 9, it is possible to apply the same assumptions used in Section 1.1, namely cost of Machines is double that of Cloth, production costs in the US being twice as much as in India, mark-up of Cloth equalling 100% and mark-up of Machines being 300%. Table 11 summarises the calculations.

Cost factor = 2 1

COSTS

	US	India
Machines (Un.)	$4.00	$2.00
Cloth (yds.)	$2.00	$1.00

Income factor = 4 2

INCOME

	US	India
Machines (Un.)	$16.00	
Cloth (yds.)		$2.00

With Int'l Trade

	US	India
Machines	$16.00	-$16.00
Cloth	-$10.00	$10.00
TOTAL $	$6.00	-$6.00

Income from Export

Table 11. Dollar profit from international trade (Comparative Advantage)

The only one Machine exported by the US to India in order to balance the domestic production in the autarchic case generates an income of $16 whereas the 5 yards of cloth exported by India to the US only generate $10. Even in the Comparative Advantage scenario, the richer country increases its national wealth at the detriment of the poorer country.

Although Ricardo's example does consider prices, it fails to recognise price difference between the two countries and, again, it is not clear whether the mistake has been done in good faith or whether

considerations of national economic policy have deflected the author from a more rigorous academic evaluation of the matter.

4. Putting Real Numbers into The Models

So far as theoretical models are concerned, models are of little use if they do not describe in a generalised (yet simplified) form what happens in the real world. Lack of real world data has been pointed out as a serious weakness of both Smith's and Ricardo's models. The same remark could be made of Sections 1.1 and 1.2 where money has been inserted into the models, so it is now time to analyse results when realistic data is being used. The assumption made in Sections 1.1 and 1.2 were:

1) Production cost of Machines to Cloth ratio = 2
2) Export price of Cloth to cost ratio = 2
3) Export price of Machines to cost ratio = 4.

If these assumptions do not hold, then the entire criticism to the two authors would be void.

4.1. Production cost of Machines to Cloth ratio = 2

The U.S. Bureau of Labor Statistics (BLS) publishes data about a whole range of industries and in particular about manufacturing (BLS, 2020). Although this is a larger sector than Machine production, BLS data can be used as a proxy for the Machine production, bearing in mind that, if average output and compensation in the Machine industry is higher than averages in overall manufacturing, being the former a subset of, and a more added-value sector than, the latter. Data published by the Bureau (see Appendix B) state for 2018 an hourly compensation in the manufacturing industry of USD 43.16, which shall be used as an approximated production cost for Machines. This figure does not take into account the cost of components for Machines, which is certainly higher than raw material for Cloth. This assumption will be discussed later.

Unfortunately, no compensation data for the textile sector in India is available, but the comparison could be worked out using the average income-per-capita in India (IBEF, 2020, p.21) of $1,800 in

2018. Bearing in mind that the textile industry in India is likely to pay below average compensations (as it is a relatively poor industry), the results obtained using that figure inflate the calculation in favour of the production of Cloth. The BLS Table also states USD 38.50 being the average weekly hours worked in the manufacturing industry in the US. Assuming (rather generously) the same weekly working hours in India and 49 working weeks (with 5-day-per week that is to say 245 working days p.a.), the hourly compensation in the Indian textile market would work out as UDD 0.95. The actual ratio between production cost of Machine and production cost of Cloth is therefore more than 45, whereas the ratio assumed during the discussion of the theoretical model was just 2. This deviation does not impact on the calculation in a direct manner. All production costs are assumed to be paid to national employees, therefore not affecting overall domestic wealth. Yet, since the export price is computed as a multiple of the production cost, it indirectly affects the amount of money paid by each country for the imported goods. The value of 2 assumed in the model more than compensates for the simplifying assumption of Machine's production cost being made up of only workers' salary.

4.2. Export price of Cloth to cost ratio = 2

For the Indian textile sector (a proxy of Cloth production) the India Brand Equity Foundation's (IBEF) Textiles and Apparels report (IBEF, 2020, p.9) displays the Indian textiles market size for 2017 as USD 150.0 billion and 223.0 billion forecasted in 2021, whence a simple linear interpolation allows to approximate the 2018 value to USD 165.68 billion and a linear regression raises the value to USD 170 billion. In the following, the latter figure shall be used. The same report (*ibid*. p.8) states that the textile sector "employed more than 45 million people in 2017-18", yielding a yearly output of USD 3,777.78 per employee (3,681.89 in case of linear interpolation). Therefore, the export price of Cloth to cost ratio is 2.10. This matches quite well with the assumption made above of a ratio equal to 2.

4.3. Export price of Machines to cost ratio = 4

The Bureau of Labor Statistics also reports the manufacturing hours worked in 2018 (26 billion) and the dollar output of the industry (4,249.66 billion). The output/hour ratio can therefore be computed as

USD 163.45 and the export price to cost ratio as 3.79, not too far from the hypothesized value of 4.

Finally, it is possible to perform the calculation carried out in Section 1 and Section 2 with numbers from real life. The results are reported in Table 12 (case of Absolute Advantage) and Table 13 (Comparative Advantage).

Cost factor = 43.16 0.95

COSTS

	US	India
Machines (h)	$43.16	
Cloth (h)		$0.95

Income factor = 3.79 2.10

INCOME

	US	India
Machines (h)	$163.45	
Cloth (h)		$2.00

With Int'l Trade

	US	India
Machines	$326.91	-$326.91
Cloth	-$20.03	$20.03
TOTAL $	$306.88	-$306.88

Income from Export

Table 12. Dollar profit from international trade with realistic data (Absolute Advantage)

Cost factor = 43.16 0.95

COSTS

	US	India
Machines (h)	$43.16	
Cloth (h)		$0.95

Income factor = 3.79 2.10

INCOME

	US	India
Machines (h)	$163.45	
Cloth (h)		$2.00

With Int'l Trade

	US	India
Machines	$163.45	-$163.45
Cloth	-$10.01	$10.01
TOTAL $	$153.44	-$153.44

Income from Export

Table 13. Dollar profit from international trade with realistic data (Comparative Advantage)

The realistic values drawn from real world data (although with some approximation) confirm the qualitative result: the richer country gets richer thanks to international trade and the poorer country does impoverish further. In the light of findings in this Section, obtained by simply inserting realistic values into the model, it seems that the authors failed to consider the matter objectively. It could be argued that

they were analysing a different scenario but, if at all, the country gaps were, in their times, even more profound in favour of the most developed economy of the world and to the detriment of India.

5. Including Consumerism in the Calculation

According to findings on the Comparative Advantage model, the richer country would be happy to increase its exports to the poorer one as this trade would further increase its wealth. Yet, the poor country does not have an objective need to import more, as the import level quantified in the model equals its consumption in the autarchic case. In order to push imports, a new theory was needed and the theory created for this purpose is called Consumerism. The topic is a delicate one as it involves political stances and debate is open-ended. Among many, O'Shaughnessy and O'Shaughnessy (2002, p.524) discuss, with the goal of rejecting Consumerism, the claim that "today's consumer society is hedonistic, due largely to modern marketing practices". Indeed, if the richer country could convince, through marketing techniques or psychological submission (a marketing technique in itself), the citizens of the poorer country to mimic the richer country's level of consumption, its export would increase. Referring back to the example displayed in Sawyer (2017), in a case of Absolute Advantage (Table 14) if either country sells the whole of its own surplus to the other, economic value (prices multiplied by the quantity exported) matching, it would be an equal trade with no net money transfer; however, as seen in Table 12, use of real world data starkly changes the scenario. The US would increase their export of Machines (from 2 to 5; +150%) and India would do the same with yards of Cloth (from 10 to 15; +50%). Not only is one Machine-producing hour much more expensive than one Cloth-producing hour, but also more Machine hours are exported. The net result is that the US would get richer while India would get correspondingly poorer, its indebtedness (at least in the model) increasing.

With Int'l Trade

	US	India	TOTAL
Machines (Un.)	10	0	10
Cloth (yds.)	0	30	30
Export Machines	5	5	
Export Cloth	15	15	

With Int'l Trade

	US	India
Machines	$817.27	-$817.27
Cloth	-$32.69	$32.69
TOTAL $	$784.58	-$784.58

Income from Export

Table 14. Dollar profit from international trade with realistic data and Consumerism (Absolute Advantage)

In the case of the US, extra money earned from international trade would be balanced by the lack of surplus (as it has all been exported) but the extra Machines India imports, by the very definition of Consumerism, would not increase real domestic well-being but affluent desires. This last statement is critical to the evaluation of international trade under Consumerism as well as to the whole economic system in which most of the world's population lives. It is largely a matter of opinion whether purchasing goods that are not strictly needed bring any benefit at all. Great economists have suggested a dubitative approach to Consumerism, Thorstein Veblen (1857-1929) probably being the sharpest critic of all. His witty yet rigorous analysis of 'conspicuous consumptions' is still valid today (Veblen, 1899). A more recent paper, Rohatyn (1990, p.78), is no less critical: "[the ideology of ceaseless consumption of material goods as a way of life] benefits corporations far more than ourselves […] every new acquisition generates disappointment, restlessness and another round of conspicuous (hence pointless) consumption". The matter is obviously open to differing opinions.

The same broad reasoning would apply to the Comparative Advantage case, as shown in Table 15.

	US	India	TOTAL
Machines (Un.)	10	0	10
Cloth (yds.)	0	10	10
Machines (Un.)	20/3	0	20/3
Cloth (yds.)	15	5	20
Int'l Trade M	5	5/3	
Int'l Trade C	15	5	

With Int'l Trade

	US	India
Machines	$272.42	-$272.42
Cloth	-$10.01	$10.01
TOTAL $	$262.41	-$262.41

Income from Export

Table 15. Dollar profit from international trade with realistic data and Consumerism (Comparative Advantage)

If it can be assumed, as sounds reasonable, that more economically advanced countries were also more advanced in marketing techniques (academia may also have had a role in this), it may be possible that a marketing-led combination of free trade and Consumerism turned into a globally accepted culture. Under this assumption, such a combination could be considered the main cause of huge increases in export income to the more advanced countries and the further impoverishment for the backward ones. Under this scenario, again, free trade seems to be a trap in which rich countries

attract poor ones, to increase their own wealth, to the detriment of the rest.

6. Criticisms to the Theory of Comparative Advantage

The theory of Comparative Advantage has attracted many criticisms but none of them have gone to the core of the theory itself. Most scholars that have criticised Comparative Advantage do so with the purpose of improving it, to make it more robust and raise it above the unrealistic assumptions it is based upon. Production costs are seldom restricted to labour; costs pertaining to other factors may not fit the pattern used to compare labour in different countries. Similarly, labour is not homogeneous over different production lines. Return is not constant across production scale as implied by the theory, not taking into account the law of decreasing marginal production. Moreover, it goes without saying how little the full employment assumption resembles reality and must also be noted that transport costs are not null. Yet, in the literature, there are virtually no statements rejecting Comparative Advantage altogether. Research from Gonzalez (2006) is accurate but it does not criticise the theory itself, only its application, especially to the agricultural sector, and Xie (2019) states that policies based upon the theory will fail in practice in the long run even though they may succeed in the short run. Costinot (2009) highlights that the model, being composed of one factor, two goods and two products, is far too simplistic, while the Heckscher-Ohlin model fails to depict reality although recognising a value in multi-dimensional models, yet these no longer show results as strong as the two previous models. Blaug (1985) identifies some major pitfalls in the theory by recognising that production cost difference may be a serious blow to it and therefore re-states it in a manner to stand against such criticisms: "The Law of Comparative Cost can be expressed succinctly as stating that each country will produce those goods whose alternative costs are relatively lowest, alternative costs being the number of units of one good that must be forgone to produce a unit of another good. This way of stating the doctrine covers every possible cost situation" (*ibid*. pp. 25-26). It looks like many authors (as those cited above) try to defend the theory of Comparative Advantage by anticipating its critics and finding a response to them. A minority of authors (Gonzalez, 2006, among others) expose the consequences of theory application and its

perils for less developed countries but again fail to identify its theoretical drawbacks.

7. Conclusion

Despite the widely acclaimed worth of free international trade, the results are no so clear cut. Whereas on the one side it can be stated that total world production definitely increases thanks to free commerce, the price paid by importers and exporters differ markedly. In case of equally distributed Absolute Advantage, the matter relies on whether commodities and final products are being justly priced. Yet, industrial goods (usually produced by more technologically advanced countries) incorporate much more added value and therefore command much higher prices than commodities, or agricultural or handcrafted goods. This, as seen in the previous Sections, leads to further enrichment of industrialised and service-providing countries and further impoverishment of agriculture- and commodity-driven economies. Yet, as noticed by many commentators, evenly distributed Absolute Advantage (as assumed by Adam Smith) is a rare occurrence in modern world, a much more frequent situation being the one depicted by Comparative Advantage (by David Ricardo). Even more noticeable in this case is the dominance of economies that enjoy productive advantage. By taking production costs and output prices from the real world, it clearly appears that most industrially and technologically advanced countries would enjoy higher income from free trade to the detriment of less developed countries. It must be borne in mind that this paper does not aim to state definitively about the merits of free trade with respect to autarchy but only to assess the academic rigour of the two models proposed in support of free trade and, according to the sources used throughout, the result cannot be positive. If, on the one side, it is true that the US balance of payments to India has largely been negative over recent decades, the difference in GDP per capita between the two countries is an accomplishment. This does not mean that free trade must be responsible for the GDP delta. That free trade, however, is a magical solution for the improvement of the economic condition of any country is a claim that the two authors fail to demonstrate.

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APPENDIX A

Statement. Under Absolute Advantage, free international trade results in wealth increase for both parties involved in it.

Assumptions. (1) Labour in each country is homogeneous. (2) Labour in each country is the only resource needed for production. (3) Employment is full. (4) Neither employment nor technology is about to change in the foreseeable future.

Proof. Two countries, C_r (a rich country) and C_p (a poor one) produce two goods each, an Industrial good, I, and an Agricultural one, A, assumed to take the same amount of worked hours to produce in both countries. Under autarchic policies Cr produces quantity Q_{Ir} of Industrial goods and quantity Q_{Ar} of Agricultural ones whereas Cp produces Q_{Ip} of Industrial product and Q_{Ap} of Agricultural goods. Total world production is $Q_{Ir} + Q_{Ip} + Q_{Ar} + Q_{Ap}$ (TableA1-1).

ABSOLUTE ADVANTAGE

Without free trade

Resources		Cr	Cp	TOTAL	
R	Industrial goods (h)	**Qir**	**Qip**	Qir + Qip	(Qir > Qip)
R	Agrricultural goods (h)	**Qar**	**Qap**	Qar + Qap	(Qar < Qap)

Table A1-1. Production in the autarchic case

Under a free trade scenario each country would only focus on the production in which it enjoys the Absolute Advantage, doubling the production in it and zeroing output of the other goods. In this case total world production rises to $2\ Q_{Ir} + 2\ Q_{Ap}$ that, under the Absolute Advantage assumptions $Q_{Ir} > Q_{Ip}$ and $Q_{Ar} < Q_{Ap}$, results in an increased global output (Table A1-2).

ABSOLUTE ADVANTAGE

With free trade

Resources		Cr	Cp	TOTAL	
2R	Industrial goods (h)	**2 Qir**		2 Qir	(> Qir+Qip)
2R	Agrricultural goods (h)		**2 Qap**	2 Qap	(> Qar+Qap)

Table A1-2. Production in the free trade case

After free trade, each country will receive the same quantity of the non-produced good as it produced in the autarchic case and also enjoys an extra quantity of the produce good, namely $Q_{Ir} - Q_{Ip}$ for C_r and $Q_{Ap} - Q_{Ar}$ for C_p (Table A1-3).

ABSOLUTE ADVANTAGE

With free trade

		Cr	Cp	TOTAL
Production	Industrial goods (h)	**2 Qir**		2 Qir
	Agrricultural goods (h)		**2 Qap**	2 Qap
Consumption	Industrial goods (h)	**2 Qir - Qip**	**Qip**	
	Agrricultural goods (h)	**Qar**	**2 Qap - Qar**	
Extra quantity	Industrial goods (h)	**Qir - Qip**		
	Agrricultural goods (h)		**Qap - Qar**	

Table A1-3. Outcome of the free trade

Thus, with the same 2R resources, in one hour country C_r produces quantity 2 Q_{Ir} of Industrial goods and country C_p produces quantity 2 Q_{Ap} of Agricultural goods. In order to balance the missing production due to specialisation, each country exports a fraction of its output to the other one; namely country C_r exports Q_{Ip} of Industrial good to C_p which, in its turn, exports Q_{Ar} of Agricultural good to C_r. Because of specialisation, the exported quantity takes less than one hour for the required resource to produce and the dollar amount charged to the importing country will be proportional to the working time needed. Country C_r will charge C_p N dollars per each worked hour and producing Q_{Ip} will cost it less than one hour; similarly country C_p will charge n dollars per hour while producing Q_{Ar} will take it less than one hour. Let us quantitatively define Q_{Ir} / Q_{Ip} as the competitive advantage of C_r and Q_{Ap} / Q_{Ar} the comparative advantage for C_p. Each country will export a quantity of goods corresponding to the dollar amount equal to the hourly price (N or n, respectively) multiplied by the inverse of its competitive advantage: $N \cdot (Q_{Ip} / Q_{Ir})$, and $n \cdot (Q_{Ar} / Q_{Ap})$, respectively, where the quantities within parentheses are both less than 1. Therefore, it can be said that each country varies its own wealth by the dollar amount charged for its export divided by its competitive advantage in the exported product less the dollar amount being charged for its import divided by its competitive disadvantage (equal to the competitive advantage of the other country). This may sound paradoxical, as the larger the competitive advantage, the more money a country is expected to earn. Yet, this is not the case, as should the disadvantaged country only content itself with importing a very small quantity of goods (equal to the one it is going to produce under

autarchic regime), the amount of dollars shall also be small (this introduces Consumerism into the equation, discussed in Section 4).

So, under the simplified assumption that both countries enjoy the same competitive advantage to each other (that is, Q_{Ip} / Q_{Ir} = Q_{Ar} / Q_{Ap}), the result would be that, under a free international trade regime, not only would C_r enjoy a larger production of the more expensive industrial goods but it also receives a larger money inflow from exporting to C_p than it pays for its imports (Table A1-4).

ABSOLUTE ADVANTAGE

With free trade

		Cr	Cp	
Production	Industrial goods ($)	**2 N h**		(N > n)
	Agrricultural goods ($)		**2 n h**	
Profit & Loss	Industrial good ($)	**Nh (Qip/Qir)**	**-Nh (Qip/Qir)**	
	Agrricultural goods ($)	**-nh (Qar/Qap)**	**nh (Qar/Qap)**	
	TOTAL	N - n	n - N	

Table A1-4. Outcome of free trade with hourly prices

In conclusion, C_r has been enriched and C_p has been impoverished from engaging in specialisation and free international trade. The statement to be demonstrated is therefore false.

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APPENDIX B

Data extract from BLS (2020)

Division of Major Sector Productivity, Bureau of Labor Statistics
Data reflects press release of September 3, 2020
Full report: www.bls.gov/news.release/prod2.nr0.htm

Year	Hours worked (billions of hours worked)	Hourly compensation (current dollars per hour worked)	Average weekly hours worked (hours worked per job per week)	Current dollar output (billions of current dollars)
1987	34.877	16.366	37.3	1623.685
1988	35.935	17.022	37.7	1759.959
1989	36.152	17.591	37.7	1857.205
1990	35.02	18.55	37.1	1903.996
1991	33.698	19.448	37.0	1875.41
1992	33.422	20.515	37.3	1959.108
1993	33.811	20.794	37.7	2042.912
1994	34.673	21.112	38.2	2184.82
1995	34.904	21.655	37.9	2339.958
1996	34.867	22.247	37.9	2429.368
1997	35.579	22.648	38.4	2575.684
1998	35.704	23.866	38.2	2620.633
1999	35.133	25.24	38.2	2721.616
2000	34.854	26.872	38.0	2843.85
2001	32.594	27.664	37.2	2695.053
2002	30.278	28.569	37.3	2692.112
2003	28.796	30.1	37.2	2776.357
2004	28.626	31.228	37.5	2984.473
2005	28.299	32.399	37.2	3303.09
2006	28.529	33.159	37.8	3493.661
2007	28.047	34.474	37.8	3734.98
2008	26.868	35.487	37.5	3818.3
2009	23.413	36.657	36.8	3147.076
2010	23.409	37.12	37.9	3514.871
2011	23.861	37.807	38.1	3914.936
2012	24.424	38.447	38.3	4032.945
2013	24.614	38.66	38.4	4119.536
2014	25.004	39.722	38.4	4156.943
2015	25.247	40.723	38.3	3879.961
2016	25.258	40.936	38.4	3800.526
2017	25.512	42.264	38.4	3976.779
2018	25.999	43.156	38.5	4249.659
2019	25.98	44.408	38.0	#N/A

Table A2-1. Extract of US manufacturing industry data (source: BLS, 2020)