

CM10: THE DIVISION OF LABOR AND COMPARATIVE ADVANTAGE (3-31-21)

SOME, BUT NOT ALL, OF WHAT YOU NEED TO KNOW

You really need to know surprisingly little because I sometimes do the same piece of analysis in three different ways.

1. What does the term “the division of labor” mean?
2. What is the oldest (Smith’s) example of the division of labor?
3. Why does the division of labor depend on the size of the market?
4. Why does the division of labor lead to more output per person?
5. Is it true that “I became rich simply through my own hard work not because I relied on other people to help me”?
6. What does Absolute Advantage refer to?
7. Is it possible for two countries to engage in mutually advantageous (but not necessarily equally advantageous) trade even if one has an absolute advantage in the production of all goods and services?
8. What does Comparative Advantage refer to?
9. When deciding on a profession should you chose to do whatever you are better at doing than everyone else?
10. If Jane has 10 pairs of socks and 2 pairs of sneakers and Bill has 6 pairs of socks and 1 pair of sneakers, which of them has relatively more socks than sneakers?
11. 10 is larger than 5 does that mean that $1/10$ is larger than $1/5$?
12. If $10X$ cost $5Y$, what does $1X$ cost, and what does $1Y$ cost?
13. If Jim has a comparative advantage in economics relative to history, compared to Faye, then can he also have a comparative advantage in history relative to economics compared with Faye?
14. What does the phrase “terms of trade” refer to?

15. What is the difference between the Consumption Possibilities Curve (CPC) and the PPC?

Question 16 is more time consuming than anything I would include in an exam. But you should be able to do parts (b) and (c) in less than 70 seconds. Working this problem will help you to master CA.

16. Angora (A) and Bewildered (B) produce only xylophones (X) and yams (Y). They have the same size labor force and the same access to technology. But their labor forces are not equally suited to the production of X and Y. Here are three possible sets of production possibilities for the two countries:

(1) A can produce 13X or 13Y.

B can produce 5X or 10Y.

(2) A can produce 10X or 10Y.

B can produce 10X or 10Y.

(3) A can produce 7X or 14Y.

B can produce 10X or 4Y.

In each case:

(a) Plot the PPCs for both countries.

(b) Determine if one country has an Absolute Advantage in producing X or Y.

(c) Determine if either country has a Comparative Advantage in producing X and/or Y.

(d) Determine the maximum/minimum price that each country would pay/accept before it would trade.

"The greatest improvements in the productive powers of labour, and the greatest part of the skill, dexterity, and judgement with which it is anywhere directed, or applied, seem to have been the effects of the division of labour." Adam Smith: *The Wealth of Nations* (1776, Book 1, Chapter 1, first sentence.)

1. THE DIVISION OF LABOR

1. *The phrase "the division of labor" is an eighteenth-century term that simply means specialization. What Smith meant by "the division of labor" was specialization in production, the division of the tasks to be performed amongst workers so that each performed usually one (sometimes more than one) specialized operation(s).*



2. Smith gave a *famous example* of the division of labor; the making of pins in a pin factory: He writes " ... a workman not educated to this business ... could scarce ... make one pin in a day ... but it [the making of pins] is divided into a number of branches, of which the greater part are likewise peculiar [specialized] trades. One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires three distinct operations; to put it on is a peculiar [specialized] business, to whiten the pins is another; it is even a trade by itself to put them into the paper; ... the ... business of making a pin is ... divided into about eighteen distinct operations, which in some manufactories [factories], are all performed by distinct hands [workers], though in others the same man will perform two or three of them. I have seen a small manufactory ... where ten men ... could ... make among [between] them about twelve pounds of pins in a day. There are in a pound upwards of [as many as] four thousand pins of middling size. Those ten persons ... could ... make ... upwards of forty-eight thousand pins in a day. Each person ... might be considered as making four thousand eight hundred pins in a day."¹

¹ You can read the whole of *The Wealth of Nations* here: <http://www.econlib.org/library/Smith/smWN.html>

This link suggests that a modern UK pin factory produces about 800,000 pins per day using large amounts of capital equipment.

<http://www.adamsmith.org/blog/economics/of-pins-and-things/>

I have always been skeptical about Smith's figure of an average of 4,800 pins per worker per day. Although on average each of the ten workers makes 4,800 pins any one of them specializing in a single process, for example grinding the head, would have to process all 48,000 pins. (There are eighteen processes and some of the ten workers do more than one.) Assuming that they worked twelve hours per day, with no breaks, that would mean that the worker would have to grind 4,000 heads per hour or a little over one head per second including the time to pick up the pin and fix it in place. Does that seem plausible to you? The link in the footnote quotes Smith's French sources.²

These YouTube videos provide wonderful examples why we practice the division of labor. Please look at them if you have time.

<https://www.youtube.com/watch?v=URvWSsAgtJE>

<https://www.youtube.com/watch?v=r4Wn0DZ6czo>

3. More contemporary examples would include: the making of a Hollywood "blockbuster" film where the credits roll for three or four minutes and hundreds of people are listed; American football with its offensive and defensive teams and specialist kicker (soccer is much less specialized). The classic example is the "sexual division of labor", which was practiced by our hominid ancestors long before there were modern humans and long before we became hunter gatherers.

4. It is generally agreed that the division of labor is one of Smith's most important contributions to economics, since it embodies a concept of efficient economic activity and highlights captures a major factor in determining increases in economic wellbeing and why some countries have grown more rapidly than others. I believe that the division of labor also captures an important aspect of economic activity, that it is a social process. I would further argue the division of labor is vitally important when discussing issues of equity and to inequalities in the distribution of income and wealth. These are themes that I will return to in CM21 Distribution.

² If you are really interested you can consult "How Adam Smith found inspiration in French texts on pin making in the eighteenth century" by Jean-Louis Peaucelle and Cameron Guthrie in *The History of Economic Ideas* (2011), vol. 19 (3), 41-68. This paper shows that Smith's example was wrong!

5. The division of labor is so commonplace in our society that we are usually unaware of it. For 50 years and more I have “made” loaves of bread, gallons of gas, haircuts, visits to the cinema, visits to the dentist, foreign travel and all of the other goods and services that I consume by walking up and down lecturing to students on microeconomics; my students did not imagine that I was “producing” all those things that I consumed. Some people make a living composing the verses in greetings cards. The intense division of labor that characterizes modern economies is a relatively recent phenomenon although Neolithic people had some specialization in the making of stone tools and arrowheads and spearheads.

6. *The division of labor depends on the size of the market.* We must have enough customers to buy or barter for what we make, otherwise it is not possible to specialize. There is no point in specializing in cutting hair if there are only twenty people within thirty miles of your hairdressing shop. Modern economies are large partly because of the division of labor, and, because these economies are large, they can have greater and greater divisions of labor. The division of labor is enhanced by the use of money rather than barter. Barter is inefficient, it involves large search costs because we require a spatial, synchronous, double coincidence of wants (here, now, my fish, your loaf). Globalization has increased the world division of labor as has the internet.

7. The division of labor/specialization in production: (1) allows reorganization of production that increases individual productivity by fitting round pegs into round holes and square pegs into square holes, (2) causes “learning by doing” – repetition improves skill and efficiency, and (3) saves time switching between activities.

A downside of the division of labor is that it may involve dull, repetitive work. All of those wonderful manufacturing jobs whose demise is such a cause of concern to politicians involved doing dull, repetitive tasks day after day, week after week, and year after year. Working in a distribution center lifting heavy boxes onto a conveyor belt for ten or more hours a day is not my idea of a good job either.

<https://www.nytimes.com/2018/11/26/podcasts/the-daily/warehouse-workers-instant-delivery.html>

8. Read “I, Pencil” which emphasizes the wonders of the market but also illustrates how very interdependent we are – “No man is an island” versus the Ayn Rand and Milton Friedman belief that we are all self-sufficient (as well, in her case, as selfish). We are not Davy Crockets hunting in the wilderness (even he bought or traded for his knife and musket and gunpowder and ball). Someone who makes \$60m in a year relies upon millions of people to produce all of the goods and services she consumes so that she can concentrate on managing her hedge fund. John Paulson needs many people working with him so that he can make the billion-dollar annual incomes he makes. The

rich can become rich, and still richer, only because they live in a society that is dominated by specialization.

<http://www.econlib.org/library/Essays/rdPnc1.html>

<http://economix.blogs.nytimes.com/2009/08/25/the-economics-of-loneliness/> (Skip the comments.)

<https://www.newsweek.com/thanks-thousand-j-jacobs-coffee-radical-gratitude-1222245>

2. COMPARATIVE ADVANTAGE

1. *The History*

1. Adam Smith spends part of *The Wealth of Nations* refuting the ideas of a group of pamphleteers known as Mercantilists who believed that trade was a "zero sum game" (like poker) in which one person or country gained at the expense of the other person or country they were trading with. My interpretation of the 25th President's views on trade is that he too believes that trade is a sort of warfare in which when China wins, then the US loses. Correspondingly he seems to believe that the object of making a "deal" is to beat "the other guy". I think this idea derives from our desire to win when trading – I want to come away from a trade with you feeling that I have a real bargain, which seems to mean that you must have lost. But you regard the trade in exactly the same way that I do. If this is a voluntary trade, then the other person must believe that she has gained or she would not trade. *If trade is voluntary, we would expect that both parties to the trade believe that they will gain from the trade, although not necessarily equally, otherwise why would they consent to the trade since a voluntary trade requires you to agree to it.*

<https://www.project-syndicate.org/onpoint/trump-s-trade-game-by-dani-rodrik-2019-01>

Mercantilists believed that a country should export as much as possible and import as little as possible so that the country would end up with a trade surplus – but it is not possible for all countries to have trade surpluses simultaneously. In the 18th century a trade surplus would mean that the surplus country would accumulate gold. We work our butts off producing goods and services for foreigners to consume and they give us bars of yellow metal that we can't eat, wear, live in, or drive around in. In 2021 a trade surplus means that the surplus country will acquire financial assets from the deficit country – China imports ten-year US bonds in exchange for all those manufactured

goods. Smith argued that *trade is mutually beneficial*. The Chinese gain by selling us cheap manufactured goods and we gain by selling them services.³

2. Smith's argument was based on what economists call absolute advantage. Absolute advantage is concerned with relative productivity, if the US can produce more corn per acre than Mexico can, then the US is said to have an absolute advantage in the production of corn relative to Mexico. Smith realized that if we are more productive at producing services (we have an absolute advantage in the production of services) and the Chinese are more productive at producing cheap manufactured goods (they have an Absolute Advantage in the production of manufactured goods) then trade will be mutually advantageous. (We will mention other reasons for trade when we discuss protection in CM11.)

3. David Ricardo in *The Theory of Political Economy and Taxation* (1817) showed that *trade can be mutually beneficial even when one person or country is better (is more productive has an absolute advantage) at **everything** than the other person or country* – as is probably true of the US relative to Malawi. The US will gain if it concentrates on producing the good(s) and/or service(s) for which it is *relatively* the *low cost* producer and sells and exports the surplus of that good or service to buy and import goods for which the US is the *relatively high cost* producer – “*producing*” the relatively high **cost** goods indirectly by importing them from Vietnam, which can produce them *relatively* more cheaply than the US can. Vietnam also gains from concentrating its production on the good(s) for which it is *relatively* the low-cost producer.

2. The Concept

1. The terminology is confusing. Smith stressed **absolute advantage** which means that one person or country can produce more of X than the other person or country can: *A has an absolute advantage in the production of X if A can produce more X (for the same inputs) than B can*. Absolute advantage is about productivity and focuses on individual goods and services. I have an absolute advantage in teaching economics compared to you. Almost all of you have an absolute advantage in playing basketball compared to me.

Ricardo was concerned with *comparative advantage*, which is concerned with **relative opportunity costs**. *A has a comparative advantage in the production of X relative to B if*

³ The US trades with many countries and it is the overall balance of payments (including short - and long-term flows of financial capital) – not the trade balance with any particular country, such as China, that is important.

A has a lower opportunity cost (in terms of forgone Y) of producing X than B does – A gives up less Y than B does when producing a unit of X.

Although both absolute advantage and comparative advantage contain the word advantage, they are quite different concepts; *absolute advantage is about how productive you are compared to me, whereas comparative advantage is concerned with whether you have lower opportunity costs than I do.*

2. *Comparative* in this context essentially means *relative*; the relative costs of two goods or services in two countries. Comparative in this case refers comparing the *relative* opportunity costs of the two goods in the two countries.

3. The idea of comparative advantage is very important. For example, when you are thinking of a career you should think about your relative abilities not your absolute abilities. My son is a very good computer programmer but there are very many people at Oracle who are better at writing computer code than he is, therefore, even if his greatest talent is programming computers, he should not do so at Oracle because at Oracle his managerial skills are his comparative advantage. (You should also think about how your comparative advantage may change over time; could your chosen occupation be replaced by a machine?)

4. Although the idea of comparative advantage is reasonably easy to understand, comparative advantage does not appear to be intuitively obvious to most people. I think this is because most people do not understand that when economists use the term comparative, they really mean relative.

3. The Intuition Underlying Comparative Advantage

1. Think of a game in which a player can hit a ball with only two strokes, a forehand or a backhand. If my forehand is better than yours then I have an absolute advantage with my forehand compared to you. If my backhand is also better than yours then I also have an absolute advantage in my backhand compared to you. It is therefore possible for me to be better at both strokes than you; it is possible for me to have an absolute advantage in both type of stroke. However, it is still possible for you, with the right strategy, to have a chance to beat me.

What is your best strategy? When you play me, you have to decide whether to emphasize your backhand or your forehand. Which one you choose depends *not* on how good I am, or how bad you are, with respect to our forehands and our backhands, but how good you are *relative* to me with respect to your forehand or your backhand. If my forehand is eight times better than yours, but my backhand is only seven times

better than yours, then your optimal strategy is to try to use your backhand as much as possible – *even if it is your weaker stroke!* I am still likely to slaughter you but you are doing the best you can, given our *relative* strengths. What is important is not how good your backhand or forehand is, but how good your backhand or forehand is *relative* to my backhand or forehand.

Now, if my forehand is *relatively* better than your forehand, then your backhand **must** be *relatively* better than my backhand. It is **not** possible, in this two-stroke game, for me to be *relatively* better at *both* the forehand and the backhand *relative* to you, or vice versa. What we are comparing is *ratios* and if the forehand ratio is in my favor, then the backhand ratio *must* be in your favor. Of course, it is possible for neither of us to have a relative advantage in which case it does not matter which stroke you favor, I will always slaughter you.

2. Dave Beckham, thirty years ago the most famous person in the world, joins your scratch soccer game. He has an absolute advantage in all aspects of the game – he is even better as a goalkeeper! Whether you use him as a striker (scoring goals) or a defender (stopping goals) depends on how good your attack is compared to your defense *relative* to your opponents' attack compared to their defense. You should use him to strengthen the part of the game at which you are *relatively* weak! If, *relatively*, your attack is better than theirs then use him in defense, if your defense is *relatively* stronger than theirs then use him to attack. If you have no relative advantage then it doesn't matter where he plays. (Not a realistic example – give him the ball and he'll keep it except when he slams it into your opponent's net.)

3. Billy Rose was better at writing shorthand than any of his secretaries but he didn't use his absolute advantage as a stenographer because his comparative advantage was managing Fanny Brice's career – he had a huge absolute advantage as a stenographer, but *relatively* his managerial skills were more valuable than his stenographic skills.⁴

4. If you think that you have a good intuitive idea about comparative advantage then skip sections 3 and 4 of the Commentary. But if you really want to understand comparative advantage read on – slowly! Alternatively, you can skip to section 4 below and if it helps then great, and if it doesn't then do not fret about it.

3. *The Arithmetic Underlying Comparative Advantage*

⁴ Rose was also a great lyricist, writing the lyrics for "Me and My Shadow", "It's Only a Paper Moon" and other famous ballads that even your parents don't remember! Billy Rose was the third husband of the comedienne Fanny Brice. Her second marriage to the professional gambler "Nicky" Arnstein was the basis for "Funny Girl" the musical and film that made Barbra Streisand world famous.

1. Comparative advantage is easiest to see if we do a little arithmetic (really!), but if you are number shy then ignore the arithmetic and try the geometry and if that is not to your taste, then concentrate on the words. Ricardo's original presentation of comparative advantage illustrated the idea with a simple numerical example involving trade between England and Portugal in terms of wine and corn (corn is what the English call wheat – corn in the American sense used to be cattle fodder for the English!)

2. This argument will only make sense to you if you write the numbers down and check the computations as you read these paragraphs. You must do the arithmetic; just reading the sentences will simply confuse you. You may find that it helps to use physical objects: pennies for apples and dimes for pears, or different colored M&Ms for the apples and pears.

3. The example has nothing to do with trade or economics; it is simply designed to show you how *relative* (which is what the *comparative* in comparative advantage means) relates to *ratios*.

4. Eve has 40 apples and 4 pears. Adam has 4 apples and 2 pears. Eve has more apples and more pears than Adam (she has absolutely more apples and pears), but we are not concerned with the absolute amounts of apples and pears, only their *relative* amounts.

Eve has *ten* times as many apples as Adam does but only *twice* as many pears as Adam does.

Therefore, Eve has *relatively* more apples than pears *compared* to Adam because 10 to 1 is bigger than 2 to 1 (40/4 and 4/2).

This **must** mean that Adam has *relatively* more pears than apples *compared* to Eve. Adam has half as many pears as apples, whereas Eve only has one tenth as many pears as she has apples. Since a half is bigger than a tenth Adam has *relatively* more pears than apples compared to Eve (1 to 2 is bigger than 1 to 10 ($1/2 > 1/10$)).

We are concerned with *ratios* – *relative* amounts. Eve's ratio of apples to pears is 40 to 4 or 10 to 1 (10/1). Adam's ratio of apple to pears is 4 to 2 or 2 to 1 (2/1). Since 10 to 1 is a higher ratio than 2 to 1 Eve has *relatively* more apples than pears compared to Adam.

However, *if we go in the opposite direction* – comparing pears to apples rather than apples to pears – then the ratios have to be turned upside down (inverted). Eve has 4 pears compared to 40 apples or 1 pear per 10 apples, and therefore her ratio of pears

to apples is 1 to 10 ($1/10$) – she only has one tenth as many pears as she has apples. (Note that Eve’s ratio of pears to apples is one tenth ($1/10$), which is her ratio of apples to pears – ($10/1$) – turned upside down, inverted.) Adam has 2 pears to 4 apples or 1 pear to 2 apples – and so he has half as many pears as Apples (his ratio of pears to apples is $1/2$). (Note that one half – $1/2$ – is $2/1$ turned upside down.) Since $1/2 = 5/10$ is bigger than $1/10$ Adam has *relatively* more pears than apples compared to Eve: *This is just a consequence of what we mean by a ratio: if $3/2$ is bigger than $1/2$ then $2/1 = 6/3$ must be bigger than $2/3$.*

If when we compare the ratios of apples and pears Eve has a higher ratio (relatively more apples than pears) compared to Adam, then when we compare the ratios of pears to apples Adam must a higher ratio of pears to apples than Eve because when you turn the ratios upside down the initially larger ratio must end up smaller in its upside down form. This is arithmetic – the logic of comparative advantage is impeccable.

4. An Economic Example: Meet the Sleeppeople

1. Now we return to the economics of comparative advantage. In terms of comparative advantage (which is simply *relative* advantage) the fact that Australia has a comparative advantage in the production of sheep in terms of sacrificed sugar compared to Brazil, *must* mean that Brazil has a comparative advantage in the production of sugar in terms of sacrificed sheep compared to Australia – this is a tautology, something that is true by definition, in this case the definition of comparative advantage in terms of *ratios* of sheep to sugar and sugar to sheep.

2. Janna can produce 6 meals or 18 loads of laundry in a day. Allan can produce 4 meals or 8 loads of laundry per day. Janna has an *absolute* advantage in *both* the *production* of meals and laundry because, for the same input of labor, she can produce two more meals or ten more loads of laundry per day than Allan can. But if they co-operate and specialize and reorganize according to their *relative opportunity costs*, they can both be made better off – trading the good they produce for the good that they don't produce (they “produce” the other good indirectly via trade). *It will be beneficial for them to trade if they have different opportunity costs – as they do.*

Allan can produce 4 meals or 8 loads of laundry, which means that if Allan produces 1 meal, he gives up 2 loads of laundry. (When doing comparative advantage questions, it helps to divide through to get units/ones – here 1 divided by 4: $4/4 = 1$ and $8/4 = 2$.) Janna can produce 6 meals or 18 loads of laundry, which means that if Janna produces 1 meal, she gives up 3 loads of laundry (dividing by 6). So, the opportunity cost to Allan of producing a meal is 2 loads of laundry, whereas the opportunity cost to Janna

of producing a meal is 3 loads of laundry. Therefore – because 2 is less than 3 – *Allan has a comparative advantage in producing meals (measured in loads of laundry) compared to Janna.*⁵

Remember that *absolute advantage is about productivity* – how many meals or how many loads of laundry you can produce in a given time – whereas *comparative advantage is about opportunity costs*, how many loads of laundry do you give up when you produce a meal.

Now we go in the other direction. Allan can produce 8 loads of laundry or 4 meals, which means that if Allan produces 1 load of laundry, he gives up $1/2$ of a meal (divide by 8). Janna can produce 18 loads of laundry or 6 meals and so when she produces 1 load of laundry, she gives up $1/3$ of a meal (divide by 18). Because $1/3$ is smaller than $1/2$ ($2/6$ is less than $3/6$) *Janna has the comparative advantage in doing laundry compared to Allan.* Note that we have turned the ratios – which correspond to opportunity costs – upside down ($2 = 2/1$ becomes $1/2$ and $3 = 3/1$ becomes $1/3$). If 2 is less than 3 then $1/3$ is less than $1/2$ – this is arithmetic. If Allan has a Comparative Advantage in making meals in terms of sacrificed loads of laundry compared to Janna, then Janna *must* have a comparative advantage in doing the laundry relative to preparing meals compared to Allan: we have simply turned the ratios upside down.

5. Once More With Diagrams

1. Economists use PPCs to illustrate comparative advantage. Look at Figure 1 below. On the horizontal axis we are plotting loads of laundry, L, and on the vertical axis meals, M. Allan can produce 8 loads of laundry if he does nothing but launder clothes. Allan can produce 4 meals if he does nothing but cook. We join the 8 point on the horizontal axis to the 4 point on the vertical axis to obtain Allan's PPC.

2. I am **assuming** *constant marginal costs* (MC) so that the PPCs are drawn as straight lines, not bowed out as in CM3. (MC is the opportunity cost of the marginal/last unit produced; the slope of the PPC.) I make this assumption to make your life easier but it is not very difficult to do the analysis with increasing MC and, hence, concave PPCs. (We are also assuming that it is possible to produce infinitesimally small quantities of L and M otherwise we would have a PPC that was a set of distinct points.)

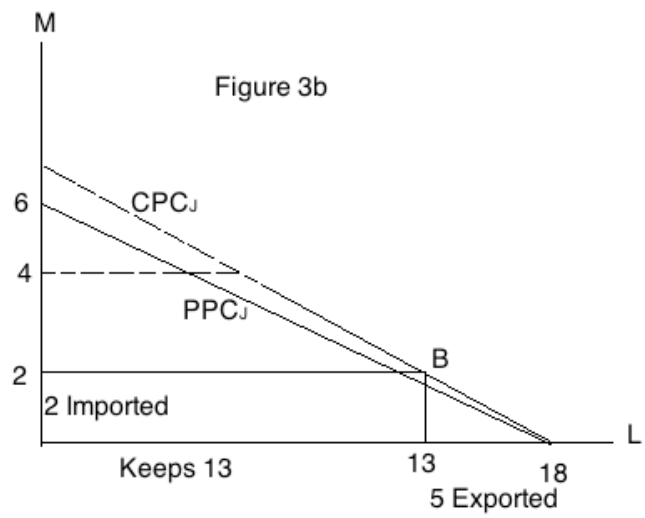
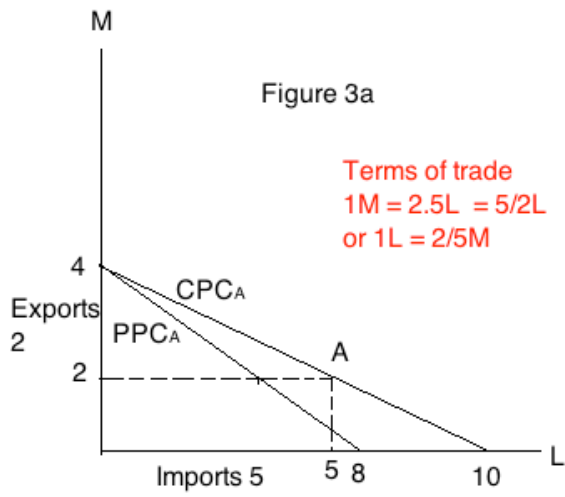
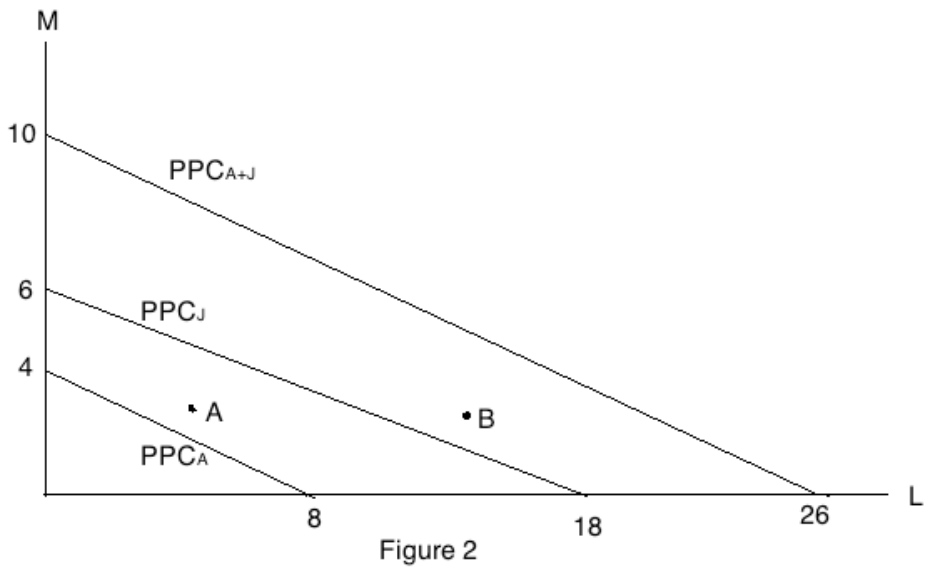
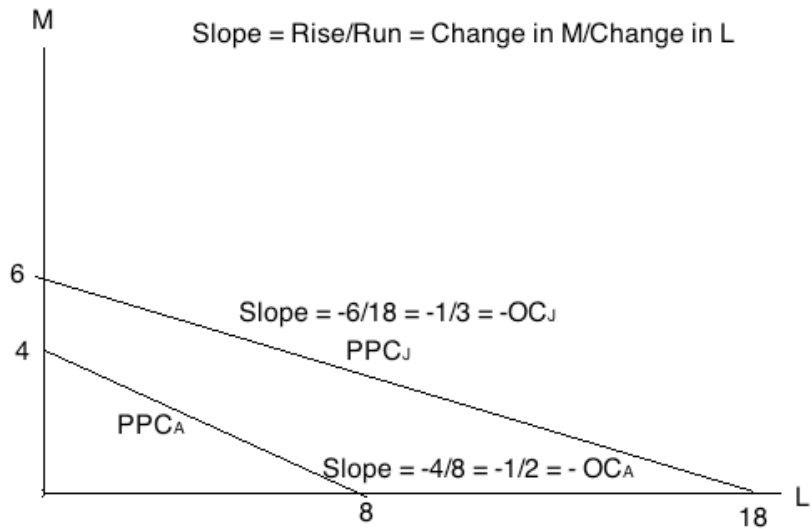
3. My apologies that the scales of the diagrams are incorrect, my drawing program is very simple, it has to be because I am IT challenged! I don't know if it is possible to do

⁵ In reality I do the laundry and Janna does the cooking – I do other things as well (e.g. our finances) aside from sitting around looking cute.

a better job with the Paintbrush program, I don't think it is. However, this deficiency provides you with a wonderful opportunity to test your understanding by re-drawing the diagrams properly to scale.

Note that figure 3b should have **7.2** on the vertical axis where Janna's CPC cuts the M-axis.

4. Janna can produce 18L or 6M and if we join these points, we obtain Janna's PPC. Notice that Janna's PPC is to the right and above Allan's PPC, which means that Janna has an absolute advantage in both L and M compared to Allan.



5. There is no reason why the PPCs can't cross, in which case one person would have an absolute advantage in making meals and the other an absolute advantage in doing the laundry. But it is the slopes of the curves that are of interest.

6. Notice that in Figure 1 the two PPCs are not parallel – they have different slopes. This means that Allan and Janna have different opportunity costs (strictly speaking the slope is the negative of the opportunity cost). If the two people have different opportunity costs then they will gain from specializing and trading, but if they have the same opportunity costs then specialization is pointless – if the opportunity cost of a making a meal is 2 loads of laundry for both Allan and Janna then they cannot gain by specializing and trading; there is no point in dividing the work (labor) between them.

7. Now look at Figure 2, which shows Allan and Janna's joint PPC when they operate as a single unit; they specialize, Allan in meals and Janna in laundry. If they both do the laundry then they can produce $8 + 18 = 26$ loads of laundry and if they both produce meals then they can produce $4 + 6 = 10$ meals. If we join the extreme points on the axes then we get their joint PPC, which has a different slope ($10/26 = 5/13$) than either of their individual PPCs ($4/2 = 1/2$ for Allan, and $18/6 = 3$ for Janna).

Working together allows Allan and Janna to specialize in producing the product for which they each have a comparative advantage compared to the other person. If Allan specializes in making meals then he can produce 4 meals but does no laundry. If Janna exploits her comparative advantage by specializing in laundering and does no cooking then she can produce 18 loads of laundry but zero meals.

8. At this point we run into a problem. Ricardo's model – the one that we are using – only deals with production, the supply side of a market transaction. It was not until 1848 that John Stuart Mill added the demand side that we need if we are to do the analysis in its full glory.⁶

In addition to the production possibilities we would need to know the preferences of Janna and Allan between meals and laundry – we need to know about demand as well as supply. *If Allan and Janna are to trade, they have to agree on the rate at which they can exchange meals for laundry loads since they each only produce one of these commodities.* They need an exchange rate or price at which the number of meals that Allan wants to trade or export is equal to the number of meals that Janna wants to buy or import, and such that the number of loads of laundry that Janna wants to exchange

⁶ Don't feel badly if you have problems with Comparative Advantage it was forty-one years after the publication of *The Wealth of Nations* before Ricardo worked out the puzzle of Comparative Advantage and another thirty-one years before John Stuart Mill put the final piece in place.

or export is equal to the number of loads of laundry that Allan wants to buy or import. So, we will determine the exchange rate or price at which they trade (what economists call the *terms of trade*) **arbitrarily** – I am going to **invent** a plausible number.

We know that it costs Allan 2 loads of laundry if he produces 1 meal and so Allan will not sell or trade or exchange or export a meal for *less* than 2 loads of laundry. We also know that Janna can make a meal at a cost of 3 loads of laundry therefore Janna will not buy or trade or exchange or import a meal if it costs *more* than 3 loads of laundry, because she would be better off producing the meal herself. Therefore, the *terms of trade*, or the exchange rate, or the *price of meals in terms of loads of laundry*, must lie between 2 loads of laundry and 3 loads of laundry – exactly where being determined by the demand curves and supply curves of Allan and Janna. I will **assume** – *arbitrarily* (so that the numbers come out reasonably easily) – that the correct terms of trade is 1 meal = 2.5 loads of laundry ($1M = 2\frac{1}{2}L$). With this information we can generate the *Consumption Possibilities Curves (CPC)* of Allan and Janna. *The CPC tells us which combinations of L and M are possible (available to them) if they cooperate and trade.*

10. Allan's CPC is shown in Figure 3. Allan can produce 4 meals and he could *potentially* trade or sell or export them for $4 \times 2.5 = 10$ loads of laundry, and so *his CPC hits the horizontal axis at 10 L, whereas his PPC hits the L axis at 8 L*. Because *Allan's CPC lies above and to the right of his PPC he will have superior consumption possibilities available to him if he specializes and trades.*

If Janna exploits her comparative advantage and specializes in doing laundry then she can produce 18 loads of laundry, 18L; she can convert those 18 loads of laundry into meals at the rate of $1L = \frac{2}{5}M$ (if you can swap 1M for $2 = \frac{5}{2}L$ then – by turning the ratio upside down – we get the rate at which L swaps for M: $M = \frac{2}{5}L$), that is, she could, in principle, exchange, or trade, or export, all of her laundry for 7.2 meals ($18 \times \frac{2}{5} = 7.2$). Janna's CPC is the line joining 18 L on the horizontal axis to the point 7.2 M on the vertical axis. *Because 7.2 L is bigger than 6 L Janna's CPC lies above her PPC; she has superior combinations of L and M if she trades.* You all noticed the snag – Allan can't produce 7.2 meals and he probably doesn't want 18 loads of laundry anyway. Which is why I have hatched the part of Janna's CPC above 4 M.

11. **Assume**, for sake of the argument, that Allan is willing to export 2 of his meals and wants to keep the remaining 2 meals. He can sell his surplus two meals to Janna for 5 loads of laundry ($2 \times \frac{5}{2} = 5$). If Janna is happy to keep 13 of her loads of laundry and exports the remaining 5 loads of laundry for 2 meals ($5 \times \frac{2}{5} = 2$) then, at the assumed terms of trade, exports = imports. Both Allan and Janna are better off specializing and trading than if they did not specialize and trade. The consumption combination of M

and L labeled A in Figure 3(a) is on Allan's CPC and above Allan's PPC and the combination of M and L labeled B in Figure 3(b) is on Janna's CPC and above her PPC.

12. This is *not* a mathematical proof that we can make both Allan and Janna better off if they specialize and trade, but it does demonstrate that such gains are possible. After 120 years economists have the theory of Comparative Advantage well and truly nailed down: we can handle (mathematically) cases with more than two goods, more than two countries, non-linear PPCs, transportation costs, etc.

13. There is no reason to believe that individuals, and even less, countries will ever completely specialize in the production of one good or service. In fact, as we will see when we reach CM11 there is a great deal of trade between countries involving different brands or varieties of the same good – the US both exports cars to Canada and imports cars from Canada.

6. CAVEAT

1. However, while we have demonstrated that both Allan and Janna can be made better off, that does not mean that they are *equally* better off – one party may gain more from trade than the other. And it is **very** important to note that the moment we move from individuals to aggregates – individual US states, whole countries – then we have to face the fact that although the comparative advantage argument holds for the aggregates it will almost certainly not hold for each and every individual making up the aggregate. For example, if we assume that the US is trading steel for Mexican corn then some US agricultural workers who were growing corn will be displaced and they may not find a job in the steel industry or in any other industry. And the Mexican steel workers who are displaced may not be better off even if they get a job on a farm growing corn. Therefore, although the US and Mexico as *nations* gain from trade in the long run because of comparative advantage, individual American and Mexican workers may be made worse off during the transition period in which production on both sides of the border is reorganized.

The standard reply to this caveat is that “in the long run” (when the displaced workers have retired and only new workers are flowing into the labor market) everyone will be better off. But as John Maynard Keynes observed: “in the long run we are all dead”.

Economists argue that the winners should compensate the losers, but they seldom do so – which is something that we will discuss in CM12.

Also note that the theory of comparative advantage is a static theory and assumes instantaneous adjustment and that there is *full employment*. (6,606)