

# INCREASING RETURNS IN A COMPARATIVE ADVANTAGE WORLD

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## 1. *The old new trade story*

I like to begin classes on international trade by telling students that there are two basic explanations of international trade. The first is comparative advantage, which says that countries trade to take advantage of their differences – a concept that lay at the heart of Alan Deardorff’s beautiful, classic paper “The general validity of the law of comparative advantage” (1980). The second is increasing returns, which says that countries trade to take advantage of the inherent advantages of specialization, which allows large-scale production – which is what the “new trade theory” was all about.

I also like to illustrate these concepts from everyday experience. Everyday illustrations of comparative advantage are, of course, a staple of introductory textbooks – why sports stars shouldn’t mow their own lawns, etc. But it’s equally easy to illustrate the role of increasing returns. Even if two people are equally suited for the roles of rocket scientist and brain surgeon, it makes sense for one to specialize on surgery and the other on rockets, because mastering either skill takes years of study, and it would be wasteful for both people to master both disciplines.

So far, so good. But I have also usually tied this potted explanation of what trade theory is all about to a potted version of world economic history as a play in three acts: the fall and rise of comparative advantage. Act I goes as follows: before World War I there was a high level of

world trade, and this trade fitted the comparative advantage paradigm pretty well; it was mainly between very different countries exporting very different goods. British trade, in particular, was mainly a matter of exporting manufactured goods and importing raw materials, and as a result most of the trade was with primary-product exporters that either had much higher land-labor ratios or were at a much lower level of economic development.

This first global economy was largely dismantled by wars and protectionism. Act II focuses on the recovery of trade after World War II, which took a very different form. Much of the growth of trade was the result of liberalization agreements among advanced countries, so that trade between similar countries came to dominate overall flows. And much of this trade between similar countries was also trade in similar goods – intraindustry trade – driven mainly by specialization due to increasing returns, a point noticed early on by Balassa (1966). The new trade theory – or, as my students tend to call it, the old new trade theory – began by using models of monopolistic competition to make sense of this similar-similar trade, essentially formalizing the Balassa’s original story.

Finally, in Act III comparative advantage staged a comeback. Trade liberalization in developing countries led to a sharp rise in North-South trade, which meant that once again much of world trade was taking place between very different countries. Unlike in the pre-WWI era, however, developing countries weren’t mainly exporting primary products. Instead, they were exporting labor-intensive manufactures. This trade was able to grow so much in part because reductions in transport cost made it possible to fragment production into labor-intensive and skill-intensive stages (the subject of another line of Alan Deardorff’s work, e.g. Deardorff (200x)). So trade in today’s world, like trade before World War II, is largely driven by comparative advantage, in which countries trade to take advantage of their differences.

As I said, this is the story I and many others have been telling for some time. And it's right in many respects. I now believe, however, that it misses an important point: the key role played by increasing returns, mainly in the form of localized external economies, even in times when the broad pattern of trade reflects comparative advantage. These localized externalities played a large role in the world economy of the early 20<sup>th</sup> century – and they play, if anything, an even larger role today.

## *2. Collars and cuffs, buttons and cigarette lighters*

The rise of the “new economic geography” and the increasing use of gravity-type relationships for empirical trade analysis (e.g. Deardorff 199x and Eaton and Kortum 2001) have put space and distance into the mainstream of international economics. Yet we still tend, much more often than not, to model countries as dimensionless points. That's a strategic simplification that makes a great deal of sense for many purposes. But I have recently convinced myself that it's a habit that leads us to miss much of what was really going on in Acts I and III of the story described above.

Let's start by talking about the geography of industrial economies in the late 19<sup>th</sup> and early 20<sup>th</sup> century.

Many writers on economic geography have found inspiration in Chapter 10 of Alfred Marshall's *Principles of Economics* (1880), on “the concentration of specialized industries in particular localities.” Marshall mentioned such examples as the Sheffield cutlery industry and the Staffordshire pottery industry, but there were many other examples that would have been familiar to his readers: the Nottingham lace industry, the Dundee jute industry, and so on.

On the other side of the Atlantic, the twelfth (1900) census included a quantitative assessment of industry localization (Hall 1902), which demonstrated the extraordinary degree to which some industries were geographically concentrated: detachable collars and cuffs in Troy, NY, underwear in Cohoes NY, costume jewelry in and around Providence, silk in Paterson NJ, and more.

Some of these localized industries owed their origin to specific advantages of the site, but many were the result of historical accident – the blacksmith’s wife who supposedly invented the detachable collar in Troy, the local entrepreneur named Egbert Egberts who installed the world’s first power knitting machine in Cohoes. And regardless of origins, each localization was sustained by the trinity of agglomeration effects described by Marshall: information spillovers (“The mysteries of the trade become no mysteries; but are as it were in the air”), specialized suppliers, and thick labor markets. In short, external economies of scale.

And here’s the thing: at least in the case of Britain, many of these localized industries were export-oriented, selling much of their production overseas. Dundee, for example, dominated global jute manufacturing – and since burlap bags were in demand everywhere, it was largely an export-oriented cluster.

Notice that I’m not asserting that increasing returns in the form of localized external economies actually caused international trade. It was probably the case that in the mid-19<sup>th</sup>-century world economy only Britain had the right combination of resources, skills, and general technological competence to export many of the manufactured goods it did, in fact, export. In other words, comparative advantage determined the pattern of trade. Nonetheless, increasing returns were clearly evident in the local geography of production. And as I’ll argue shortly, this has important implications for how we think about the gains from trade.

Before I get there, however, let me fast forward to today's world – a world in which comparative advantage once again determines much of the pattern of trade. Thus, China's dominant role in the export of many labor-intensive manufactured goods surely reflects its combination of relatively abundant labor and relatively high manufacturing competence. There's not much historical accident in the fact that China makes the bulk of the world's buttons.

But there probably is a lot of historical accident and cumulative causation in the fact that 60 percent of the world's buttons are manufactured in the small town of Qiaotou, where, the story goes, three decades ago three brothers saw some discarded buttons lying in the gutter, realized there was a money-making opportunity, and planted the seed of an industrial cluster. And Qiaotou is characteristic of China's industrial landscape. As was the case for industrial Britain in the 19<sup>th</sup> century, many of China's manufactured exports are produced by highly localized industries whose geographical concentration shows clear evidence of the importance of external economies. Wenzhou produces 95 percent of the world's cigarette lighters; Yanbu is the underwear capital (the Cohoes of the 21<sup>st</sup> century!); and on and on.

Again, industrial localization within China probably has little if any impact on the pattern of trade measured at a national level, which basically reflects comparative advantage. But this does not, it turns out, mean that a pure comparative advantage approach tells the whole story. In particular, the story we should be telling about the gains from trade requires that we take account of the effects of external economies, even if these external economies don't affect the overall pattern of trade.

Actually, this should be obvious (but wasn't, at least to me, until I wrote this paper) from the everyday examples we use to illustrate the roots of trade. Suppose that Harry and Louise have to choose between rocket science and brain surgery – and that Louise has a clear advantage in the

surgery department (Harry faints at the sight of blood). In that case, their pattern of specialization is fully determined by comparative advantage: Harry does rockets, Louise does brains. Yet the gains from trade are to a large extent the result not of the differences between the two individuals, but of the inherent advantages of specialization: because Harry can launch Louise while Louise fixes his brain, each of the two only needs to master one skill.

So how do we model this result – trade patterns determined by comparative advantage, but trade gains nonetheless including a strong element of increasing returns – more formally?

### *3. Localized external economies and the gains from trade*

When one tries to model the role of localized external economies in international trade, it turns out that the key strategic decisions involve what one assumes about factor prices. *Within* countries, should one assume that factors are perfectly mobile, and therefore equalize across industries, or should one think in terms of “lumpy” countries (Courant and Deardorff 1992) across which wages and other factor prices differ? If factor prices are uniform within countries, what happens *between* countries? Should we assume that trade leads to factor price equalization, or should we model a world in which factor prices are unequal and in which countries that are lucky enough to get a disproportionate share of increasing-returns industries have higher wages?

In reality, there’s a strong case for arguing that the lumpy-country representation is more realistic than the assumption of perfect internal mobility. China is famously still very much a dual economy, with an industrial coast and a still-backward interior. In fact, China still has legal restrictions on internal migration, even if these are largely ignored.

And with Chinese hourly compensation in manufacturing still only a tiny fraction of Western levels (Lett and Banister 2009), it's obvious that factor-price equalization does not prevail internationally.

But this paper is an exploratory effort, which means that simplicity is of the essence. So I'm going to do violence to reality and assume both that factors of production move freely to equalize factor prices within countries and that trade leads to factor price equalization internationally. (One can, if one likes, make a partial excuse by assuming that factors are measured in efficiency units, with the productivity of labor in particular varying across countries). The meaning of the first assumption is obvious; the second will take a little explaining.

So let's bring on Samuelson's angel.

In 1949 Paul Samuelson sought to explain the fundamental logic of factor-price equalization with a parable inspired by the story of the Tower of Babel (Samuelson 1949). He asked readers to envision an original state of the world with no impediments to mobility of productive factors, so that all factor prices would be equalized. Then, he suggested, an angel came down to smite each unit of each factor on the forehead – that is, to divide labor, capital, and so on among nations, with the new rule that factors from each country could only work with other factors from the same country.

The question then becomes, how much damage did the angel do? And the answer is that if factors are not too unevenly divided among nations, none at all. For trade can, under certain circumstances, allow the world to produce the same quantity of each good, using the same factor inputs, as it would have if the angel had never made his visitation.

The basic logic is illustrated in Figure 1, which shows a three-good world economy. I'll initially assume constant returns. There are assumed to be two factors of production, capital and

labor, with the sides of the box representing the total world supply of each factor. There are three goods, A, B, and C. The vectors labeled A, B, C represent the factors that would have been employed in the production of each good in the integrated, pre-angel economy.

Now the angel does his smiting. This divides the world's productive resources between two countries, Home and Foreign. In Figure 2, the sides of the box continue to represent total world resources; resources belonging to Home are measured from the southwest corner, resources belonging to Foreign from the northeast corner, so that the division of resources can be represented by the endowment point E.

Does this division do any damage? Not as drawn. In a constant-returns world, as long as the endowment point lies within the irregular hexagon shown it is possible to allocate world production between Home and Foreign in such a way as to reproduce the integrated economy – producing the same quantities of each good, using the same factor inputs, as would have happened if there had been no avenging angel. In such a world equilibrium factor prices will be equalized. It's also straightforward to show that the pattern of trade will reflect factor abundances – specifically, if we look at the factor content of trade we will find each country exporting the factor in which it is abundant.

Now, how does this change if we introduce localized external economies? In the integrated economy, production of each good subject to such localized economies would be concentrated in a single location. To reproduce the integrated economy post-angel, this must continue to be true – which means that each good subject to localization economies must be concentrated in a single country. And this is a case already analyzed in Helpman and Krugman (1985).

Figure 3 shows how it works. Assume that good A is subject to localized external economies, while B and C remain constant returns. Then to reproduce the integrated economy production of

A must be concentrated either in Home or in Foreign, while B and C can be allocated between the countries. This in turn implies that the integrated economy can be reproduced as long as the endowment point lies within either the upper parallelogram – corresponding to concentration of industry A in Home – or within the lower parallelogram, corresponding to concentration of A in Foreign. In the figure as drawn, the endowment point lies in the upper but not the lower parallelogram, so that the only equilibrium that reproduces the integrated economy is one in which Home produces A. (There may be other equilibria that don't reproduce the integrated economy, but I disregard that possibility).

The equilibrium portrayed in Figure 3 may not look significantly different from the equilibrium shown in Figure 2. In both cases the pattern of specialization and trade is determined by resources. In both cases factor prices are equalized, and the factor content of trade reflects national factor abundances. So one might be tempted to say that localized external economies don't matter for the story.

But that turns out not to be true once we turn to the gains from trade.

The standard proof of the gains from trade – the proof that lies behind Deardorff's generalized version of comparative advantage -- is, of course, stated in terms of goods volume and goods prices. As Helpman and I pointed out (1985), however, when trade leads to factor price equalization it is also possible to think of gains from trade in terms of the dual. This isn't especially useful in most contexts. But it offers a convenient way to think about the role of localized external economies.

Figure 4 shows the constant returns case. Note that in this case we're not comparing pre- and post-angel situations – we're back to the more usual comparison between free trade and autarky. In this case the curve shows the unit isoquant for some good. The dotted line represents the

vector of resources that *would have been used* to produce the good under autarky. When trade is opened, however, factor prices – which are, remember, assumed to become equalized internationally – are different from what they would have been under autarky. And what the figure shows is that at the new factor prices, the bundle of resources that was used to produce one unit of each good in autarky now has a purchasing power that is more than enough to purchase that unit in a trading economy. Hence the nation as a whole, which consists of all its productive factors, is more than able to afford its pre-trade consumption: gains from trade.

So far, nothing new. But now introduce localized external economies. These shift the unit isoquant for each good subject to these externalities. The isoquant shifts outward in countries that don't end up producing the good, and therefore lose the external economies they had. But as long as factor prices are equalized, the only thing that matters for welfare is how a country's pre-trade isoquant compares with the post-trade isoquant in the country that ends up producing the good. And it's a reasonable presumption that this isoquant lies inside every country's pre-trade isoquant, since world production of the good and hence the strength of external economies will normally be larger than any individual country's production would have been in the absence of trade.

Figure 5 shows the implications. As before, the bundle of factors that would have produced a unit of the good in autarky are more than able to buy that unit after trade, showing that trade increases national purchasing power. But when goods are subject to localized external economies, there are two reasons for that gain. One is that countries are different, which leads to a change in factor prices. The other is that the concentration of world production in a single location allows greater exploitation of external economies, and hence raises efficiency. There are gains from trade due to the specialization of China in labor-intensive industries like button

manufacture, but there are further gains from trade – gains that accrue to the world as a whole – from the concentration of world button production in the single small town of Qiaotou.

Over the past century world trade has gone through a great arc. At the beginning of the century trade was primarily between countries with very different resources exporting very different goods, so that it seemed to be a comparative advantage world. By the 1980s trade was largely between countries with similar resources exporting similar goods, so that economists turned to increasing-returns models to make sense of what they say. But today, with the rise of China and other low-wage economies, we seem once again to be in a comparative advantage world, in which countries with very different resources export very different goods.

What I've argued in this paper, however, is that even during comparative-advantage eras increasing returns in the form of localized external economies plays a significant role. In fact, the same eras in which comparative advantage seems to have ruled international trade are also the eras in which increasing returns has seemed to exert its strongest influence on *intra*-national economic geography. And this observation isn't irrelevant even in the trade context: gains from localization arguably are a significant source of gains from trade, even if they don't seem to affect the pattern of specialization.

Does this have any relevance to current policy disputes? Well, many people – myself included – have argued that imports of labor-intensive goods from developing countries exert a depressing influence on the real wages of less-skilled workers in advanced countries. This may still be true, but the role of local external economies may offer a partial offset: if Chinese buttons are cheap not just because of low wages but also because of the advantages of the Qiaotou cluster, U.S. imports of buttons have an ambiguous effect on low-skill wages rather than a definite Stolper-Samuelson effect.

I don't want to push this too far, however. The main point of this paper is simply to point out that increasing returns – made apparent by the localization of industries – have historically played an important role in world trade even in eras when comparative advantage seems to reign supreme.

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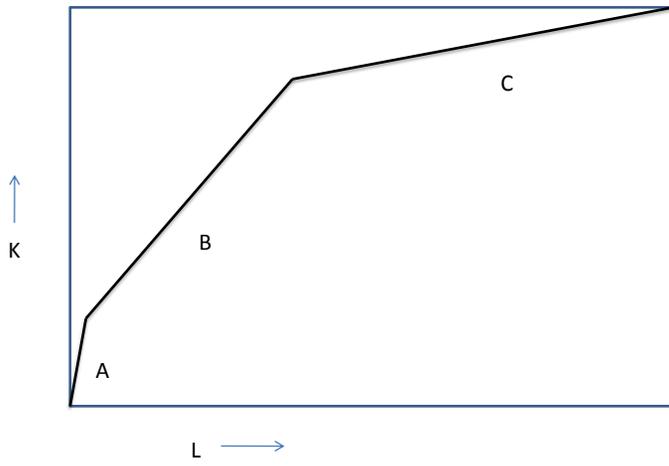


Figure 1: The integrated economy

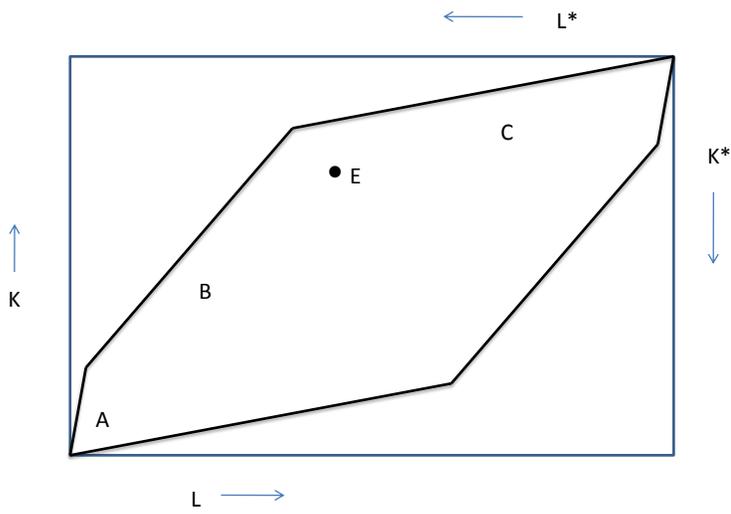


Figure 2: After the angel smites

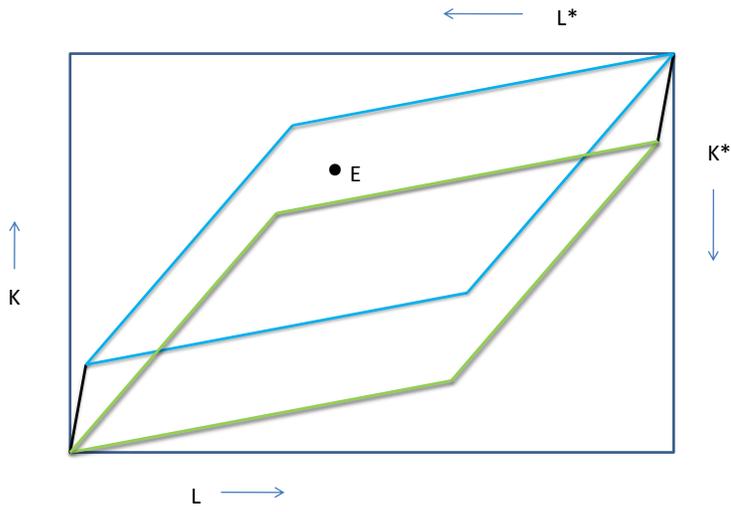


Figure 3: Reproducing the integrated economy with localization

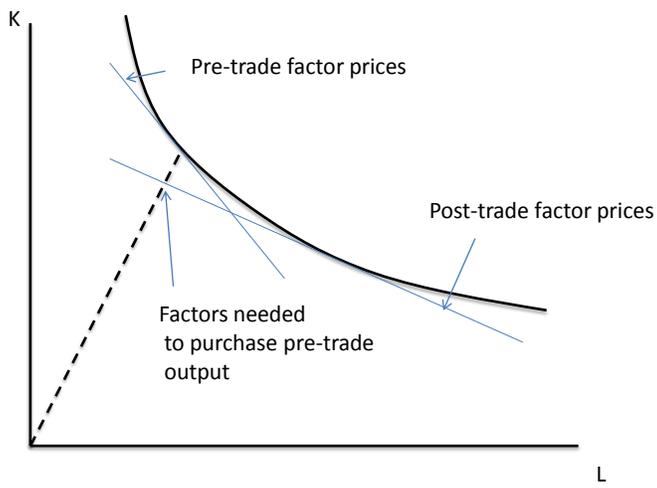


Figure 4: Gains from trade in a constant returns world

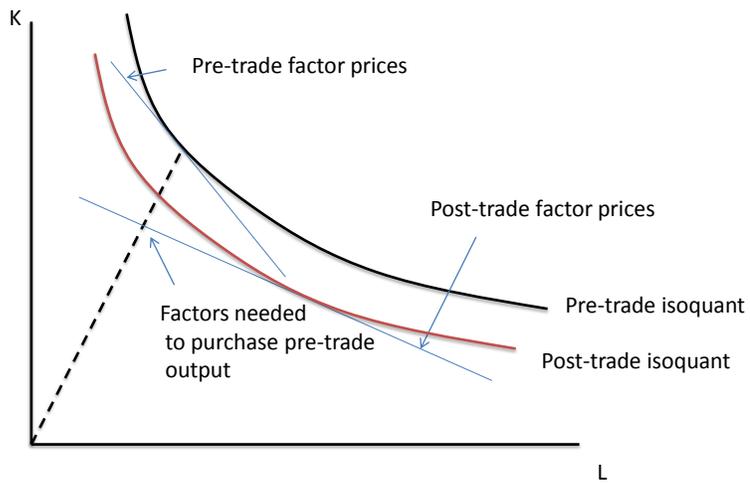


Figure 5: The gains from trade with localized external economies