ECONOMIC GROWTH

Opening trade between two countries is a one-time gain. Japan specializes in stereos, US in computers, they trade and that's that. Everything we have been talking about thus far -- including the equalization of prices -- is supposedly a one-time effect, a *short-term* thing.

But what are the *long-run* effects of specialization and trade? Here, the story gets murkier and the links are weaker. Why? Because things change over time. More precisely, the demand and supply curves *shift over time* because of an underlying, long-run phenomenon known as "**economic growth**".

Allocation vs. Growth

Let's take stock of where we're at.

In all our discussions of trade, we have been implicitly assuming the trading country's total **resources** (i.e. land, capital,, labor hours, etc.) were ***fixed*** in amount. What we were concerned with was ***allocating*** those resources efficiently so as to obtain the greatest amount of **output** (stereos, computers, cars, etc.) from them.

We saw that **trade** was a rather *efficient* way of squeezing more output out of your inputs. If two countries specialized and traded with each other, *each* of them will obtain *more* output from their *given* resources than they could obtain on their own. We saw this with numerous examples.

But that leaves several things hanging. Granted that trade *increases* the size of the pie. But what determines the size of the pie we have to begin with? And how does that "initial pie" change over time? This is what **economic growth** theory is concerned with.

The "initial pie" -- the amount of output an economy can produce on its own -- depends on the amount of resources available in the economy. By this we mean that total amount of **capital**, **labor** and **land** in the economy. It also depends on **technology** because the more efficiently firms can combine these resources, the more output can be produced.

[*Note bene*: We're asking what is the amount they *can* produce -- sheer ability -- not the amount they *will* actually produce. The latter question is much more intricate and we will come back to it later.]

So, let's ask the question again: what determines the amount of labor, land, capital and technology available to an economy? And, more to the point, how do we *increase* those resources? That is the trillion dollar question (literally). Nobody is actually quite sure. Theory here is much more slippery and uncertain -- and contentious.

Let's go through each category -- land, labor, capital and technology.

LAND

We use the term "land" as short-hand to denote all inputs into production that are provided by nature. So it includes acres of land, but also rivers, mineral deposits, etc.

The amount of land available is often regarded as "fixed" in economic models.

This, as we know, is not strictly true. Land *can* be increased quantitatively (e.g. claiming land from the sea, draining swamps, etc.). Land can also be improved *qualitatively* (e.g. improvements in land fertility, irrigation, manipulation of rivers, etc.).

Still, land is not a very easy thing to increase. It usually takes a long time and an enormous amount of effort to "create" land. And land is, of course, constantly lost too (think of desertification or the depletion of non-renewable energy resources). These losses probably balance out some of the gains of new land acquisitions.

So, on the whole, it is not unreasonable to regard land as (more-or-less) "fixed".

LABOR

Labor is not quite as "fixed" in quantity as land. What determines how much labor is available in an economy?

(A) Affecting Population Size.

Clearly, the primary determinant of the amount of labor available to an economy is the number of working-age people that live there, the ***size*** of a population.

(i) *Birth Rates*

How do we increase the size of a population? Ask a eight-year-old this question and the answer is bound to be "by people having babies", i.e. **birth rates** (what demographers call "fertility").

On the face of it, "people having babies" seems more like a straightforward "fact" of biology, demography and culture, and not something that is easily influenced by economics. People will have children because that is what people naturally *do* and have always done.

But economic concerns are not completely irrelevant. You are sure to hear in your development courses about how birth rates and family size are influenced by things like wealth and income distribution. This, indeed, was what Malthusianism was all about.

The crux of Robert Malthus's famous 1798 tract, *Essay on Population*, was precisely that *when people's incomes increase, birth rates will increase*. That is sometimes called "the Malthusian hypothesis" of population growth.

[Technical Note: You may see Malthus's theory written as "the rate of food supply growth is slower than the natural rate of population growth". For the mostly rural poor of old Europe, food supply *was* the prime determinant of their income/standard of living. Notice also the word "natural population growth". That is the birth rate people would have *if* they could afford to have families of whatever size they wanted. Malthus believed people naturally wanted very large families and were just prevented from having them because they couldn't afford them. So the moment that affordability constraint was lifted by the slightest increase in income, the size of families inevitably increased accordingly. To quote a folksy phrase from back then, "Men multiply like mice in a barn, when they are given unlimited means of subsistence" (Cantillon, 1755). So the differing growth rates of food supply/income & natural population growth means that *actual* population growth (*actual* family size) is "constrained" by an income barrier. So *any* alleviation of that income barrier (i.e. increased income for the poor) will be followed by an automatic *increase* in birth rates.]

At the time Malthus wrote, the proposition seemed to make sense. England, up until around 1750, had experienced virtually *no* increase in population size for centuries. But from 1750 to 1830, population began increasing faster and faster -- initially at 0.8% a year, then 1.2% a year, hitting 1.7% per year in 1820s. There was a population growth explosion going on.

But that same 1750-1830 period coincided with the period known as the "**agrarian revolution**", which greatly increased agricultural productivity and thus the food available to the poor. So this period seemed to give credibility to the Malthusian hypothesis: improvements in standards of living were driving a population explosion.

But then things changed. In the 1830s, just as the *industrial* revolution started and people's standards of living began climbing even faster, population growth in the UK suddenly began to slow down and has, by and large, stayed slow since. . The Malthusian hypothesis seems to have fallen apart.

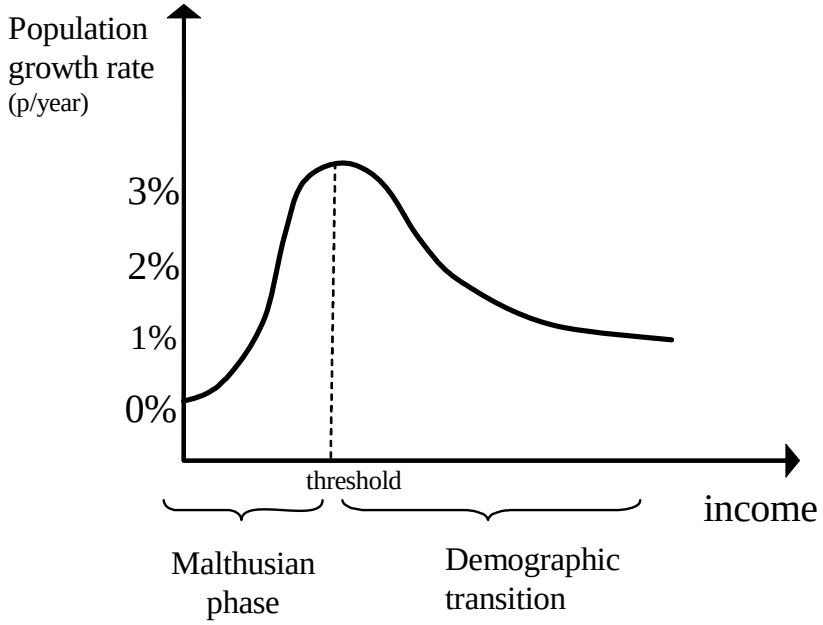
Today, when Western standards of living are enormously high, fertility rates are actually *negative* (i.e. less than two children per couple, people aren't producing enough babies to even replace themselves). This would certainly give the lie to Malthus's theory.

What happened? Economists call this the "**demographic transition**" of the 19th-20th Century, when increased living standards led people to begin *curbing* family size. Basically, the explanation is that when people have *very* high incomes, they begin to prefer higher standards of living for themselves rather than larger families.

The consensus nowadays is roughly that among the poor, the Malthus hypothesis still holds water: increases in income lead to increases in birth rates; but as income continues increasing, then after some threshold level, birth rates begin declining.

We can depict this phenomenon in the diagram below, which plots population growth rates against income level. At very low income, population growth is zero or negative, but as income begins rising, a population explosion ensues - population growth rates climb from

0% to 1%, then to 2%, etc. This is the "Malthusian phase". But after income passes that threshold level, the demographic transition happens and population growth rates begin to slow down (3% to 2% to 1% and so on.)



The exact income threshold at which the transition begins has been variously estimated to be somewhere between $1,500 and $2,500 per annum. Once that threshold level of income is surpassed, population growth rates begin declining.

(ii) ***Death Rates***

Population size is determined not only by the entry rate, but also by the exit rate, i.e. by **death rates**. That is a very important number and much more amenable to influence.

Economic historians have shown that spurts in population growth are often due less to sudden increases in birth rates, and more to sudden decreases in death rates. These are usually related to things like **health**, **sanitation** and **education**.

Improved techniques of midwifery cutting down on childbirth deaths (or both mother & child) is often cited as perhaps the single most important element in explaining the explosion in population growth in Europe during the 18th C.

Government economic policy may not be proficient at changing the number of babies people, but they are certainly capable (by health spending and the like) capable of affecting how many people die.

But sometimes birth & death rates can be related. *Contra* Malthusians, some people argue that the poor have large families not because they "naturally" like it and can afford it, but because they are trying to increase the probability of at least *one* of the children surviving to

adulthood and helping take care of the parents in their old age. So, the argument goes, if you can bring death rates down, you might *also* bring birth rates down (eventually).

(iii) ***Immigration*** is another way of "increasing" the sheer size of a working-age population in a country. It, too, responds to economic incentives: countries with high living standards tend to attract a disproportionate amount of immigrant labor. And it is very amenable to increases/decrease by government policy (if a bit politically messy).

One of the great attractiveness of using immigration to increase population size (rather influencing birth/death rates) is the "gestation" period is much, much shorter. A baby takes nearly two decades to become a laborer. Immigrants usually arrive in their prime working age.

Of course, immigration means an increase in the population of one country and a decrease in another, so it is not so much "growth" of population as a *reallocation* of population across countries. But since we are asking what determines the labor force of a *country*, then it is a number that matters -- and often matters a lot.

(B) <u>Labor force participation</u>.

Not everybody who exists sells their labor in the market. In many societies, a good fraction of women do not participate in the labor market, but are instead engaged as homemakers. Children,students & retirees also don't participate. So one way of *increasing* the labor force is to get people who are not in the labor market to enter the labor market.

There are question marks as to exactly what makes at-home people stay at home. One part is traditional culture, surely. But another part is plain economics: if wages are not high enough, many people believe it is simply not worth their while to quit whatever they're doing and start participating in the labor market.

This is particularly true of women. Keep in mind that women have *always* worked, even if they didn't sell their labor on the market. The trick is getting them to go from the former to the latter. It is often argued that the rate of female labor market participation is affected by the extent to which institutions & technology exist to alleviate the work traditionally done by women (e.g. alternative child-care arrangements, easier and swifter access to goods markets, availability of household appliances (and electricity to run them), etc.)

According to recent research, one of the most important causes of women *not* working is simply **wage discrimination**. For a variety of reasons, women's wages tend to be quite lower than men's. So the "traditional" arrangement of working male & stay-at-home female is in good part due to simple economic incentives. Because working outside the home is sufficiently less "worthwhile" for females, they tend to drop out of the workforce entirely rather than make different arrangements to share household and extra-household work.

Overall income turns out to be a big factor. Female labor-force participation rates tend to follow a **U-shaped** pattern (what is sometimes called "the Goldin Curve"): in low-income

and high-income households & countries, females have a rather high rate of labor-force participation; it is in the "middle-income" range where female participation is low. This U-shaped pattern has been quite persistent historically and across countries. It makes sense. Poor women work out of necessity; rich women work because the rewards are high. In the middle, the reward for work is not high enough nor the cost of leaving so unaffordable.

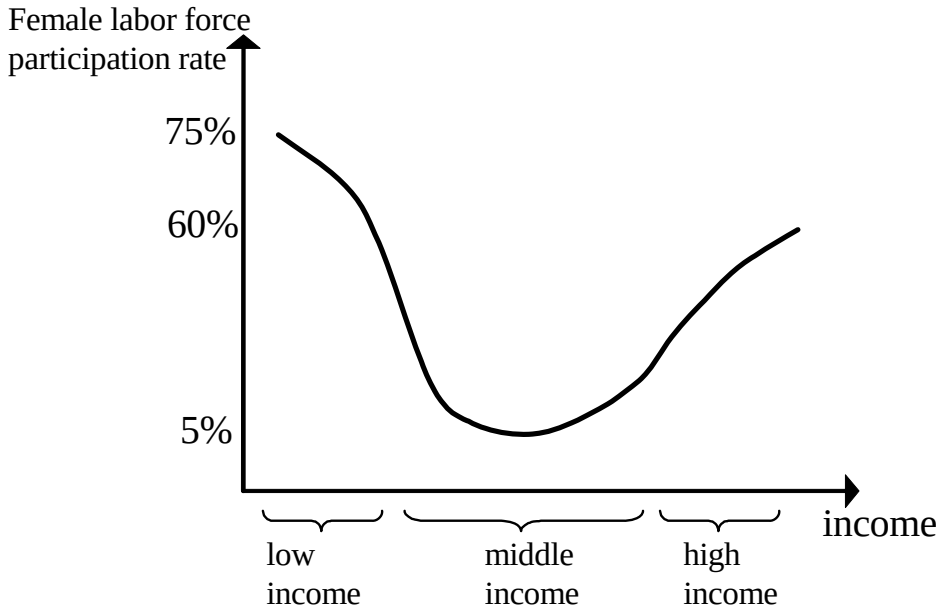


Fig. – Goldin Curve

The Goldin Curve seems empirically resilient across countries, within a country across time, or across classes, so there is some doubt as to just how it is amenable to deliberate manipulation. Women *will* join the labor force if the market wage is high enough relative to the opportunity cost (undone household & child-rearing work). While economic policy can do something about fixing market wage discrimination and reducing the opportunity cost of household work, thereby making the middle income participation dip a little less deep, it might not be enough to flatten the curve entirely.

Also not to be underestimated is the labor-force participation of the **young**. Child-labor has been essential among the poor for centuries and tends to decline as nations grow richer. But even in rich countries, like the US, teenagers are significant providers of cheap labor for numerous low-skilled/low-prestige jobs.

Retiree participation is less elastic, but not wholly inelastic. In times of acute labor shortages & high wages, it is not uncommon to see retirees returning to the labor force. But the nature of the work available affects this very much. The range of jobs is rather more limited. Jobs which require physical strength or cutting-edge technical skills, for instance, are usually outside the reach of retirees.

(C) <u>Labor Time</u>

Of course, labor can be "increased" without increasing the labor force at all -- just increase the amount of ***time*** each worker works. In this, the average wage paid is a very important element. The higher the wages, the more labor time is voluntarily supplied.

But here, too, there is limited flexibility -- often by legal regulations and the customary structure of work relationships in a particular society. The English ditty -- "Eight hours of sleep, eight hours of play, eight hours of work, for eight shillings a day" -- may not be exactly right, but that time allocation has become very customary in the industrialized world.

But it wasn't always so. 12-hour days, six days a week with no vacations except a few odd "national holidays" were customary during the industrialization era. Prior to that, labor time was actually much shorter -- because work was mostly agricultural which only required labor during certain seasons of the year.

Today, doubling or tripling shifts are often observed as temporary measures of increasing labor time. But they can rarely be sustained for a very long time -- at least not without severely affecting the quality of the labor from exhaustion. Increasing labor time is often a temporary but rarely a permanent solution to labor shortages.

(D) <u>Labor Quality</u>

Beyond the sheer population size and average hours worked, the ***quality*** of labor that population provides matters very much too. An unhealthy and illiterate population will only be able to provide low-quality labor services. So the allocation of resources to basic education and health services is very important in increasing the "amount" of labor (in qualitative terms).

Beyond these general qualitative requirements of maintaining worker quality is the element of what economists call "**human capital**", the knowledge and skills that workers acquire through education, training and, above everything, experience. This can generate a self-reinforcing effect, e.g. during employment, workers acquire skills ("learning-by-doing") which, in turn, increases the economy's ability to produce even more things.

In **sum**, while the growth of labor can be affected by economic policy, other factors (notably culture) come strongly into play which have a logic of their own and are harder to manipulate deliberately. Furthermore, the *effects* of all these policies usually takes a long time to emerge -- often a generation or two. This long gap of time between the application of a policy and the emergence of its result makes it harder to predict outcomes with precision -- so many other things can happen in the meantime.

That is why, in models of long-run economic growth, labor is often regarded as growing at some "**natural**" rate outside of our ability to affect it in any precise or systematic way.

CAPITAL

Capital, recall, is defined as the stock of "produced factors of production" (machinery, equipment, tools, building structures & raw materials).

We may not be able to increase the amount of land easily and our attempts to increase the amount of labor may take a long time to yield fruit (if they work at all). But we *can* easily increase the amount of capital available in a very short amount of time.

After all, capital, by definition, is *produced* by firms. And the decisions of firms on *how much* capital goods to produce are not grounded in "culture" or "biology" or otherwise very constrained by "natural" factors. And they don't take very long to produce either. If you need a hammer, you make a hammer - takes an hour or so, not 20 years.

What can governments do, how can they tailor economic policy, to affect the amount of capital produced?

In socialist or command economies, producing more capital is easy: the government just orders its industries to do produce more hammers, and that's that.

In market economies, firms cannot be coerced into producing more capital goods. They are concerned with profit. But they respond to market incentives. So the best a government can do is try to influence things so that the market incentives are "right"

Firms are driven by the profit motive. And so the decision about whether to produce more or less capital goods can be manipulated by simple economic things like interest rates, stock market prices and tax codes.

Before we go on, we need to introduce a critical definition which is often confusing:

> **Investment**: an *increase* in the amount of capital goods.
> **Disinvestment**: a *decrease* in the amount of capital goods.

Note that this economist's definition of "investment" is a bit different from the definition used by most people, particularly in the financial sector. For finance types, "investment" usually means *individuals* putting their *savings* in the stock market or bond market. But for economists, "investment" means *firms* producing more capital goods (i.e. more machinery, more buildings, etc.).

But the concepts are actually related. When a private citizen puts his savings in the financial markets, he is (supposedly) providing firms with funds that firms *then* use to purchase capital goods. Increases in the purchase of capital goods by firms in general prompt the particular firms that produce capital goods (e.g. developers & construction companies, tractor factories, raw material plants, energy companies, shipbuilders, etc.) to increase their

production of those goods and thus add to the stock of capital goods in an economy. Heuristically:

> Individuals' savings → banks & financial system → loans to firms → firms buy more capital goods → capital-goods-producing firms produce more capital goods.

[See our appendix on "Financial Markets" to get an idea of how the funds are channeled through the financial system].

[*Note*: Investment means the building of capital goods. That is mostly done by specialized firms on the purchase orders of other *firms* -- firms which need factories, machines, ships, trucks, etc. But *individuals* can also order the construction of capital goods too -- most notably, **housing** (which comes under the category of "capital good"). So, although most spending on investment projects is done by firms, a large proportion is done by individual home-buyers. Their reasons for "investing" are often different from those of firms. Sometimes home-buying is motivated by profit (i.e. profit from re-selling the house), other times simply because the buyers want to actually live there. But they go through the same motions of acquiring loans, etc. In the statistical accounts, home purchases by individuals are regarded as "investment spending".]

INVESTMENT

We explained that increases in capital, i.e. "investment", is governed by the following relationship:

> Individuals' savings → banks & financial system → loans to firms → firms buy more capital goods → capital-goods-producing firms produce more capital goods.

As we see, the volume of physical capital in an economy depends, ultimately, on the volume of **savings**.

And what does the volume of savings depend upon? Primarily, *income*. If I save 10% of my income, then the greater my income, the larger my savings.

That seems straightforward enough. But where does income come from? From wages, profits and rents, which are paid by firms from the proceeds of selling their output.

So notice that we have a circular relationship: the amount of investment depends on the amount of savings, and the amount of savings depends on the amount of income, the amount of income depends on amount of output and amount of output depends, in turn, on (among other things) amount of investment.

Now circular reasoning does not mean illogic. It simply means that we can *pick* our starting point anywhere along the way.

Savings First: Say's Law

In the old days, economists like Adam Smith, David Ricardo and so on believed that the starting point *must* be savings. In other words, if you want to increase investment, then you must increase savings *first*. Only after you increase savings, will you have extra funds to buy more capital goods.

So, in order to *increase* investment, consumers must first cut back on consumption and save more. This logic is sometimes referred to as ***Say's Law*** (named after the French economist, Jean-Baptiste Say, who expounded this rule back in 1803).

Investment Spending First: Keynes's Law

But Smith, Ricardo, Say, lived in a different era. In particular, the financial system was very underdeveloped. Back in the 1800s, if a baker wanted to expand his bakery, he usually had to save up funds for years before doing so.

But the British economist, John Maynard Keynes, living in 1930s Britain, knew the 20th Century world was different. Finance has become much more sophisticated, much more accessible and much more flexible. Today, if a baker wants to expand his bakery, he'll just

go to the bank and ask for a loan -- and, if approved, the loan will be given to him. Just like that.

Aha!, you may say, but doesn't the bank need funds *before* it makes a loan? Even if the baker doesn't save the funds himself, he is borrowing *other people's* savings. *Someone* still has to save *first.* Well, not quite. It is perfectly normal for a bank to give you a loan by electronically crediting your bank deposit (creating money out of "thin air") and *then* goes looking for "someone else's savings" to back that loan up.

Isn't that the same thing? Not quite. There is a bit of magic first noticed by Keynes: the savings necessary to back up the original loan *are generated* by the investment process itself!

Think of it this way. A bank forwards credit, firms spend that bank-created money on new capital goods, new capital goods means extra output is produced and sold, workers are paid extra income from the proceeds, a portion of that extra income is saved. Those extra savings are deposited in the bank. *Et voila!* The bank now has the extra funds it needs to "back up" the original loan and keep its books in order. The exact same amount? Exactly the same, Keynes replied. We'll see this in more detail later.

The main point here, Keynes argued, is that in a modern economy with a well-developed financial system, the *starting* point is the *loan* from the financial system to the firm and not -- as Say's Law implies -- the supply of funds by the individual to the financial system. In other words, although it is true savings have to back up investment, the direction of *causation* is reversed: savings do *not* cause investment; it is investment that causes savings. We can refer to this as ***Keynes's Law***.

If the argument sounds a bit obscure, look at this way. In the old "Say's Law" days, economists thought that the only way of increasing investment was to get consumers to save more, so that there would be more funds available for lending which would mean more investment and thus more capital goods. So, Say & Co. became obsessively involved with schemes to increase savings.

But this is a bit disingenuous. As per the old adage, you can bring a horse to water, but you can't make him drink. So too with firms' investment decisions: savers can provide all the funds they want, but you can't make firms borrow them. And firms won't borrow if they don't think expanding their production is profitable. And if they don't want to expand output, they don't need to expand their production capacity by ordering more capital goods (factories, machinery, trucks, etc.).

So, when talking about increasing capital, our focus should be on *investment decisions* of firms and not on the savings decisions of consumers.

Types of Investment

When firms spend on "investment", they are *buying* capital goods from firms which *make* capital goods.

Why do firms want to buy new capital goods? For one of two reasons:

(1) to **replace** depreciated capital goods (e.g. dilapidated factories, outdated or worn-out machinery, etc.). This is known as **replacement-investment**. Notice that replacement investment does *not* increase the capital stock.

(2) to **expand** its production capacity (get *more* factories, *more* machinery). This is **investment** properly speaking. This increases the capital stock. This is what we're interested in.

Expanding Capacity

Why would a firm want to expand it capacity to produce goods? Because, obviously, it *intends* to produce more goods. And why does it want to produce more goods? Because it thinks it can make a profit from selling more goods.

What might make it think that? The most obvious answer is simply that it sees that the **prices** for its goods are high. As we know from the "law of increasing cost" (the logic that underlay our supply curve), when prices go up, profit-seeking firms want to produce more output.

Does it necessarily follow then that when prices go up, firms build more factories? Not necessarily. Firms have to believe that a high price will *not* come back down. There is no point building a new factory and equipment today to produce more stuff if, tomorrow, the price comes back down and you have to cut back output. Then you're left with a useless empty factory and equipment -- *and* you still have to pay back the loan you borrowed to build it.

Firms tend to be a little more cautious than that. In fact, when most factories are set up, they are already designed to be larger than needed -- just in case there is a sudden price rise tomorrow that they don't want to miss out on. Almost all factories are designed with **extra capacity** to begin with.

If the extra capacity already incorporated into your existing factories is not enough to produce the increased output, there is a second option firms usually take: they **increase the shifts** on existing factories. So, instead of running a single day-time shift, firms will keep the factory running in the evening, even overnight, having workers do double or triple shifts, churning out the extra output. Of course, overtime pay is more expensive than regular pay, but it gives you flexibility. If the price comes back down and you're forced to cut back, you just eliminate the extra shifts.

The third option firms often go for is to **lease** an empty, existing factory and second-hand equipment. You might have to make do with worse conditions and equipment, but you can run a regular shift (saving on overtime pay) and, at any rate, its reversible. If you have to cut back tomorrow, all you do is cancel (or not renew) your lease.

So only if the high price stays high for a while -- and the firm has reasons to believe it will stay high and perhaps even increase -- do firms decide to go for extra capacity permanently. Only then do they go the whole hog and **build** (or, rather, order the building of) a new factory and buy new equipment, i.e. spends on *investment*.

Even so, we should stress the importance of existing capital equipment in this. *Even if* the firm wants to expand production permanently, why should a firm order the *building* of a new factory and the *construction* of new machinery and tools, when it can simply *buy* an empty factory or second-hand equipment at a cheaper rate? The degree of "**excess capacity**" in an economy -- a euphemism for the amount of empty factories and idle machinery out there -- will influence whether expanding production is accompanied by the building of *new* capital or not. The greater the overall amount of excess capacity in an economy, the less likely it will be for new capital to be built.

Raising funds

To pay for the construction of more capital, firms must raise funds for the occasion. They do so in one of three ways:

(1) **Borrow from banks**. This is the easiest and quickest way to get funds. But it's quite expensive -- the interest rates on bank loans aren't cheap. Furthermore, banks themselves are often willing to lend only smallish amounts, probably not enough for a massive investment project.

(2) **Issue bonds**. This is better for big investment projects. Here you are borrowing from public (via an investment bank). Although it is a little more complicated to arrange, firms can raise much larger amounts of funds and usually at cheaper interest rates.

(3) **Issue stock**. This is also a good way to raise funds. The principal advantage is that you don't have to "pay back" the funds you raise this way. Instead, you are giving the public "ownership" of the new capital equipment and promising them a share of the profits you make from it. Again, an efficient way to raise funds, but you are surrendering a portion of control over your company.

Once the extra factory/machines, etc. are up and running and the extra stuff being produced and sold, the firm can pay back its creditors (banks and bondholders) from the extra revenues. Except the shareholders, of course -- they aren't "paid back".

The Investment Decision

Investment projects come in all shapes and sizes. Firms have entire divisions coming up with investment plans of one sort or another (build a new factory here, build a new warehouse there, expand transportation fleet, etc.). They've got archives full of plans.

How many will they implement? All the ones that are profitable.

The profit from an investment project is measured as the extra revenue generated from expanding production in a particular direction (you can call this the **return on the investment**) versus the cost of borrowing the funds to finance that expansion (call this the **cost of funds**).

Profit from investment = return on investment - cost of funds

If the return from an investment project exceeds the cost of funds, the firm will undertake the project. If the return is less than the cost of funds, it will shelve the project.

Return on Investment

Simply put, the "return on investment" is the estimated extra profits made from expanding capacity. Like we said, you'll expand capacity *only* if you intend to expand production permanently, and you'll expand production only if the price is high enough -- and you expect it to stay that way for a while or think it will rise even more.

So **estimations** of new profit are the primary determinant of the return on investment. But, as we all know, estimation is a tricky thing and it often goes terribly wrong. Especially in this case, where what is being estimated is the price of your goods *tomorrow* (and next month, and years to come). But price, as we know, depends on consumer demand. So really, the firm is estimating the *extra* consumers' demand for your *extra* products. And consumers are a very, very fickle lot.

e.g. Suppose a computer firm with the capacity to produce 1,000 computers a week estimates that it is actually able to sell 1,200 at a profit. It will borrow the funds, build an extra factory to produce the extra 200. But suppose that by the time they get the extra factory built and start churning out more computers, things go awry and turns out that demand for them is slacker than they thought. As computer prices collapse, it is no longer profitable to produce 1,200 and they are forced to cut down their production to 1,000 (remember the "law of increasing cost"?). The net result of this miscalculation? An extra factory which was built and paid for that is not being used. *And* it is not merely the lost profits which the firm has to bemoan. It still has to pay back the *debt* it incurred to build the now-useless extra factory and idle machinery. Not a jolly prospect.

Lots of things come into play which may affect a firm's estimate of the return on an investment. The following are a few:

(a) Confidence. If producers make bold estimations of the return on their investment, they will expand capacity. Sometimes there is no good "cause" for that bold estimation. They just "feel" confident -- what economists call the "**animal spirits**" of entrepreneurs just take a turn for the better. But it works the other way too. If producers feel gloomy or generally pessimistic, they might under-estimate the return.

But a lot of times, entrepreneurial confidence has a bit to do with the legal and political atmosphere. The prospect of a cancelled contract or repudiation of debts by a big buyer like the government can be very scary. Or a new law prohibiting repatriation of profits or political developments which might affect exchange rates (and thus affect the real value of repatriated profits). Political talk of regulation or the outright nationalization of certain industries, an imminent breakdown in law & order or a war, etc. All these things make firms nervous and prompt them to turn down their estimates of future returns a few notches.

By far the biggest confidence factor for firms is not their own mood or the government's mood, but the mood of the most important sector: their *consumers*. If consumer confidence is low, you shouldn't expect them to go on a spending spree. If consumer confidence is low, firms get scared and lower the expectations of returns. Higher consumer confidence makes them a bit bolder. So, firms do pay attention to figures like the University of Michigan's **consumer confidence index**.

(b) Accelerator Effect. Consumer confidence is one thing, consumer purchasing power is another. Even if they're in a bad mood, people will spend more if they have more income. Perhaps not as much as they would otherwise, but they'll spend more anyway. *That* you can count on.

So, firms pay a lot of attention to how people's incomes are doing. High income means high general demand. And, more importantly, *growing* income means *growing* demand. So they pay a lot of attention to growth figures. When economies grow, people's incomes rise -- and thus their overall demand for "stuff" rises, which probably means the demand for *your* goods will be rising too. So, if firms see a *rising* trend in incomes, they may feel a bit bolder about their projections and thus expand their capacity to produce.

This phenomenon of firms investing more *in response* to growing consumer income is known as the "**accelerator effect**". Notice that it is a case of "growth causing more growth". Growth encourages firms to invest, but that very investment (increasing capital production) itself causes growth and thus even more spending. It can be a virtuous circle.

But the accelerator effect works in the opposite direction too and can quickly become a vicious circle. Falling consumer incomes prompts firms to put a quick brake on investment spending -- reinforcing that decline.

(c) Taxes. Changes in the tax code *vis-a-vis* investment spending has been surprisingly influential. The introduction of accelerated "depreciation allowances" in the US tax code in the 1950s (i.e. making a proportion of a firm's current income tax-free in anticipation of

having to replace its capital goods in the future), caused perhaps one of the greatest explosions in private capital construction in history.

(d) Foreign Trade. Firms will probably invest in expanding output if trade is opened between countries. They suddenly gain access to a foreign markets and thus anticipate a much greater demand for their product, requiring them to expand capacity quickly. At least, *some* firms will do so (those in the sectors into which the economy is specializing). Will the *overall* rate of investment increase? Possibly. But an important factor here is whether you are specializing into a *capital-intensive* or *labor-intensive* sector. If going into capital-intensive sector (like manufacturing), you'll need a lot of new capital equipment. If you're going into the labor-intensive sector (like primary commodities), you can expect lots of capital equipment from closing factories to be put up for sale and so are bound not to see much investment.

Cost-of-Funds

So much for the return. What determines the cost of raising funds?

(a) Interest rates. The cost of borrowing funds from either banks or the bond market, is the interest rate you have to pay on them. If interest rates are very high, firms are less willing to borrow.

The basic rule of thumb is then this: when interest rates are low, firms will invest more; when interest rates are high, they will cut down on investment.

e.g. Suppose a firm is considering four investment projects, A, B, C, D. The expected return for project A is 10% per year, for B it is 8%, for C it is 5% and for D it is 3%. If the interest rate on borrowing the necessary funds is 6% per year, then the firm will undertake projects A & B (which are profitable) and shelve projects C & D (which make losses). But if the interest rate falls from 6% to 4%, then notice that C now becomes profitable too. So the firm will undertake projects A, B and C and shelve only D. Investment has increased. But if the interest rate rises to 9%, then only A is profitable, and the firm will abandon projects B, C, and D. Investment has fallen.

[N.B. - Interest rates in both the bond market and bank loans are heavily affected by the interest rate in the so-called "**money market**" (i.e. the interest rate on the market for inter-bank reserves). The money market interest rate is set (or rather, manipulated deftly) by the government via the Central Bank (e.g. Federal Reserve Bank here in the US, the Bank of England in the UK, the Bank of Japan in Japan, the European Central Bank (ECB) in the euro-zone, etc.).]

(b) Stock market prices affect the "costs" of raising funds. There are three effects here:

> **(i)** Firms can raise funds by making a new issuing of shares. If the price of their *already-issued* shares (i.e. shares in the *secondary* market) is **high**, they can probably get a good price for any *new* shares they decide to issue (i.e. on the primary

market). So, a high stock price means acquiring more funds via an **additional stock issue** is "cheap" for the firm.

(ii) Firms sometimes borrow money from banks by putting up their own shares as **collateral** for the loan [Collateral = asset which the creditor can seize in case the borrower defaults.] If a borrower provides collateral, a bank will generally be willing to lend funds at a lower interest rate, depending on the value of the collateral. So, once again, if the stock market price of a firm's shares is high, then the value of that firm's "collateral" is high and can borrow funds from banks at cheaper interest rates.

(iii) If stock market price of a firm's already-issued shares is **rising**, then current holders of shares are making what in financial-parlance we call "**capital gains**" (i.e. wealth gained by the increasing value of an asset you already own). As such, shareholders will not be so demanding that firms pay them large dividends on their shares. If capital gains are substantial, shareholders are happy enough to hold the shares without any dividend payments at all! This allows the firm to spend its own profits (which would have been spent on dividends otherwise) on other things like, e.g. investment projects. These funds ("**retained profits**") are not only cheap, they're free!

[e.g. Suppose shareholders of Acme, Inc. demand that the firm make 15% in profits to be distributed via dividends to themselves. Otherwise, they say, they will sell off the stock and buy stock in *another* company (call it BlueBell, Inc.) which *does* pay them that. Normally, Acme wouldn't dare cancel its dividend payments. But if the *price* of Acme shares on the market have been *rising* recently (say, by 20% a year), then shareholders will be more reluctant to abandon them, e.g. if the capital gains on Acme shares are 20% per year but it pays no dividends, whereas the capital gains of BlueBell shares are zero (the price of BlueBell's stock is stagnant) but it faithfully pays a dividend of 15% per year, people will flock to Acme shares (even though it pays no dividends) and abandon BlueBell (even though it pays dividends).]

For these three reasons, you are bound to see firms undertaking lots of investment projects during a "**bull market**" (when the prices on the stock market are rising) and see investment falling during a "**bear market**" (when stock prices generally are falling).

(d) Openness For many countries, particularly where credit markets are underdeveloped, borrowing funds is difficult and expensive. If domestic firms are given access to foreign banks, foreign bond markets and other lenders, the costs of borrowing funds are usually lower and firms are bound to invest more. Thus, the degree of "openness" of a country to foreign lenders can help spur domestic investment.

(e) Private ownership clarity An idea popularized recently is that the absence of unclear property ownership makes the cost of funds quite expensive.

This goes back to the collateral story. Many people in developing nations "own" property *de facto*, but not *de jure*. Meaning: they have effectively "owned" their lands, homes, capital, etc. for generations, but don't have a formal piece of paper that says so. So, when applying for loans, they can't use their property as collateral as the bank needs at least some sort of deed to hold on to. Because they cannot provide collateral, the interest rates they're required to pay on their loans will be much higher than they should be.

Appended to this is simply the general level of "**rule of law**" of the country. Even if property put up as collateral is well-documented, lenders will not put much worth on it if the laws of the country are so murky or arbitrary that they stand a good chance of not being able to claim it in case of default. The general political atmosphere counts too. In a chaotic situation, that property stands a good chance of being destroyed by war or seized by a kleptocratic government. Again, its value as collateral is diminished and the costs of borrowing funds increased.

TECHNOLOGY

Increasing the amount of resources (land, labor, capital) within a country means that the amount of output that country can produce increases.

By analogy, the more ingredients you have, the greater the pie you can make. But there is something missing. A bunch of ingredients is no more a pie than a pile of bricks is a house. You need to know *how* to bake a pie. You need a *recipe*.

That recipe is what we mean by "technology".

"**Technological knowledge**" is society's understanding of the best ways to use resources to produce goods.

What this means exactly is a bit slippery. But think of it as the "recipe book" or "book of blueprints" producers in your economy have.

[Note #1: And *where* is this recipe book? A tricky question. Some of it is in secret company safes and patent offices. But it is largely intangible, embodied in the minds of entrepreneurs, innovators, researchers and workers, and influenced in turn by a million things.]

[Note #2: Technological knowledge is *not* the same thing as human capital mentioned above. Human capital is often the way this knowledge is held and transmitted, but it is not the knowledge itself.

The relationship between human capital and technological knowledge is analogous to the relationship between a skilled cook and a book of recipes.

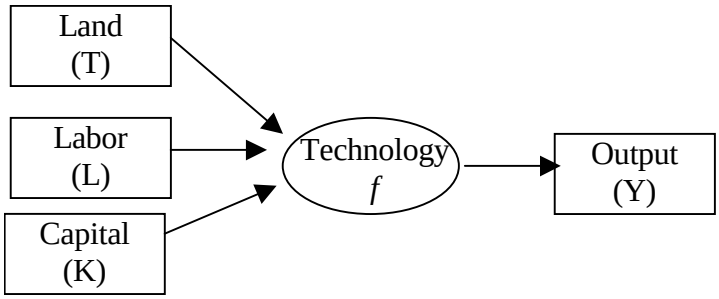
Human capital makes a skilled cook out of a non-descript laborer. A skilled cook may know how to operate an oven, he may be able to detect when water is boiled or an onion is browned. That doesn't mean he knows how to bake a pie.

Of course, it doesn't mean he *doesn't*. After all, skilled cooks often *do* know a recipe or two and carry it around in their heads (in fact, the heads of cooks is usually where recipes are created and kept). But the *definition* of a "skilled cook" (i.e. operate oven, detect boiling water, etc.) does not imply they know all recipes, the best recipes or any recipes at all.]

Technological knowledge, however unsatisfactorily defined, can be regarded as amenable to policy, e.g. research & development, patent laws, etc. supposedly "encourage" technological innovation, thus expanding the economy's ability to produce more output out of given resources.

THE PRODUCTION FUNCTION

So now let's try putting this all together. The following flowchart gives the logic of the production relationship. Land, labor and capital are put together by technology to produce output.



For those of you who prefer seeing things mathematically, this is often written:

$$Y = f(T, L, K)$$

also known as a ***production function***. We read this as saying "the amount of output is a function of the amount of land, the amount of labor and the amount of capital"

Y denotes the quantity of output, T the quantity of land, L the quantity of labor and K the quantity of capital, while *f*(.) is a function that indicates how the inputs are combined to produce outputs (i.e. technology).

[Note: I use these bizarre letters as they are the common abbreviations you'll find in practically all economic texts. They are pretty standard: amount of labor is L (from English *labor*), amount of land is T (from the Latin *terra*), amount of capital is K (from the German *kapital*). The technology used is displayed as *f* (this is the standard mathematical expression of a *function*; remember y = *f*(x) from high school?) and the amount of output is Y (for the same reason that, in high school mathematics, the dependent variable in a function is usually denoted y)].

So, the amount of output you are able to produce in an economy depends on your supply of land (T), labor (L) and capital (K) and also on current technology (*f*). So an *increase* in land, labor or capital (or all three) will *increase* your potential output. This is sometimes called "growth by ***factor accumulation***."

You can also increase output even if you don't have more inputs by simply changing technology (*f*) and so making more efficient use of what you already have. This is called "growth by ***technological progress***."

Perhaps an example will help you understand the difference.

Suppose you have 3 acres of land (T = 3), 12 laborers (L = 12), and 6 hoes (K = 6) available to you. Suppose that the technology (*f*) you use is the following recipe:

> *f* = "two workers operating one hoe together on a half-acre of land will produce ten bushels of wheat."

So, given that we have 3 acres, 12 workers, and 6 hoes, this formula can be applied six times to our resources. So total output (Y) will be 6 x 10 = 60. Or, in summary:

> $f(3, 12, 6) = 60$

i.e. we can produce 60 bushels of wheat from our resources by using this technology.

But suppose that, as time goes by, your resources double, so now you have T = 6, L = 24 and K = 12, but technology remains the same. So, now that we have more resources we can apply the formula twelve times, so total output Y = 12 x 10 = 120. Or, in summary:

> $f(6, 24, 12) = 120$

doubling inputs, we've doubled the output. This is growth of output by *factor augmentation*, i.e. growth by merely increasing the total supply of factors.

Suppose that our resources are *not* growing. Instead, some great innovator realizes that our formula stinks. Two workers with one hoe is a complete stupidity -- the workers fight over who gets the hoe, clumsily hold it together, getting in each others' way, etc. Instead, the innovator comes up with a brilliant new recipe (call it *f**):

> *f** = "one worker with a hoe on a half-acre of land and one worker behind him filling the mounds and scaring off the seed-picking crows will produce 12 bushels of wheat."

So if we had the same resources we had at the beginning (T = 3, L = 12, K = 6), we can apply the new formula six times, yielding output Y = 6 x 12 = 72. Or, in summary:

> $f^*(3, 12, 6) = 72$

we get 72 bushels of wheat. So the new formula applied to the same old resources increases the amount of output produced. That is *more* output from the *same* resources. This is what is meant by growth by *technological progress*.

GDP & GROWTH

The total amount of goods an economy can produce depends on the total amount of resources it has plus technological knowledge.

There is a standard way of *measuring* the total amount of goods (and services) produced in an economy. This is known as *gross domestic product*. The precise definition is:

Gross Domestic Product (GDP): money value of all final goods and services produced *and* exchanged on organized markets within a country in a given period of time (usually one year). GDP is simultaneously a measure of the incomes of all people in the economy and a measure of the expenditure of all people in an economy.

If the definition sounds unusually precise, it is because every one of the words used there matters. We'll get into more details about the precise details of GDP later. For our purposes, keep thinking of GDP as shorthand for the "total output" of goods produced in an economy.

The **growth rate** of GDP in any particular year (e.g. 2007) is calculated simply by the following formula:

Growth of GDP in particular year
= (GDP in particular year - GDP of previous year)/(GDP previous year)

or the *change* in GDP as a percentage of previous level. e.g. To get the growth rate of GDP in 2006, we need the GDP in 2006 (= $13.06 trillion) and GDP in 2005 (= $12.36 trillion):

(13.06 – 12.36)/(12.36) = (0.7)/(12.36) = 0.0567

So GDP growth rate in 2006 was 5.67%

As GDP is expressed in dollars, to get the growth in ***real* GDP** (increase in actual goods and services produced, not merely increase in their price tags) you need to subtract the rate of price inflation.

Growth of real GDP = growth of GDP - inflation rate

In 2006, inflation was approx. 3.24%, so the actual real growth in GDP in 2006 turns out to be 5.67% – 3.24% = 2.43%.

[*Caveat*: Of course, GDP measures *actual* production as opposed to *potential* production. Theories of economic growth focus on the latter, but the data is for the former. To calculate the growth of "potential GDP", we need to make some more adjustments to the numbers.]

MEASURING PROSPERITY

The United States of America is the country which has the largest GDP (total output) in the world. In 2008, it produced nearly $14 trillion worth of goods.

But the US is also a country with a large population, lots of land and lots of capital, so this shouldn't surprise us. Equally, it also shouldn't surprise us that countries with small populations, little land and little capital have correspondingly smaller GDPs.

But does this mean the US is the most *prosperous* country in the world? Well, depends what you mean by "prosperity". Intuitively, in a "prosperous" nation, the *average* "standard of living" of citizens should be high. This is measured in various ways.

The crudest measurement of "standard-of-living" is obtained by dividing the total output produced in a country by the number of people living in the country.

GDP *per capita*: total output per person (GDP divided by population).

Currently (2008), US GDP per capita stands at around US$46,859. By way of contrast, the Netherlands has a GDP per capita of $52, 019, Mexico of $10,235, China $3,315 and India $1,016. The contrast of standards of living between the rich, middle and poor countries seems enormous.

Of course, you can object those comparisons are not really proper since we're comparing countries, like the Netherlands, where prices of goods are really high, with countries, like India, where prices of goods are really low. Dutch may have higher income, but shoes in Amsterdam cost lot more than shoes in Delhi. So $100 in Holland buys less shoes than $100 in India, so the greater income of the Dutch may merely reflect the fact that stuff costs more there, not that they actually have more stuff. And when comparing standards of living, what we really want to know is how much stuff the average Dutchman and Indian has.

So the *proper* way to compare GDP across countries is to 'adjust' the raw number by '**purchasing power parity**' (PPP). That is, we adjust the GDP data of both countries by artificially deflating or inflating the prices so that shoes in Holland cost as much as shoes in India. *Then* we compare the results.

After carefully adjusting for purchasing power, Dutch GDP per capita (where prices are high) is recalculated to be $40,431, while Indian GDP per capita (where prices are low) is recalculated to be $2,762. That is still a stark difference. But at least we can be sure it is not caused by mismeasurement or cost of living differences. We have cleared out the distortion caused by different prices in Amsterdam and Delhi. By this we mean $40,431 and $2,762 are measured in dollars with the *same* purchasing power, i.e. we are imposing the same dollar costs of goods across countries, so that the numbers are now comparable.

The following table gives GDP per capita (adjusted by PPP) across a selection of countries

Country	GDP per capita (PPP-adjusted)
US	$46,859
Netherlands	$40,431
Australia	$35,677
Germany	$35,442
Japan	$34,100
Greece	$30,535
South Korea	$27,647
Saudi Arabia	$23,834
Portugal	$22,190
Croatia	$18,545
Russia	$15,922
Mexico	$14,560
Malaysia	$14,072
Brazil	$10,326
South Africa	$10,119
Jamaica	$7,766
Ukraine	$7,347
China	$5,963
India	$2,762
Ghana	$1, 832
Zambia	$1,399
Bangladesh	$1,334
Malawi	$837

The first thing you will notice is an enormous range and disparity. What are normally considered wealthy countries – US, Germany, Japan, etc. - hover above $30,000.[1] 'Middle income' countries cover a large range between $10,000 and $30,000, 'low income' below $10,000 and then the truly destitute at around $1,000 and below.

You should let these figures sink in for a moment.

The average American has a standard of living that is not merely greater but nearly *double* that of the average Korean. Where the Korean has one toothbrush, the American has two. OK, that might not be so surprising, after all, popular conceptions tell us Korea isn't nearly as rich as the US.

But Asia itself presents a far greater contrast within itself. That Korea is half as rich as the US may not be so stunning as when comparing Korea and India. Sure, we all expect Korean standards of living to be greater than India. How much greater? Not merely greater, not twice, not thrice, but around *ten times* that of India. Where an Indian has a toothbrush, a Korean has *ten* toothbrushes.

[1] The richest in the world is Qatar, at $85, 858. But Qatar is one of a handful of lucky 'El Dorado' cases (e.g. Luxemburg, Norway, Brunei), that is countries with miniscule populations and exceptionally large oil reserves or unique status as financial safe havens, who have GDP per capita numbers that are extreme outliers. Because this combination depends more on unusual luck than anything else, their 'formula' for success is not very informative – it is not really possible for other countries to emulate or aspire to that. 'El Dorado' states are usually set aside when discussing economic growth.

If that still isn't enough to get an idea of the disparity, try the following mental exercise: suppose you were to live the next year for $2,800. Not live in India for $2,800, but live in the United States, and pay United States prices for rent, fuel, shirts, toothbrushes and so on, everything, on a budget of $2,800 for the next twelve months. How far would you get? How do you imagine your material standard of living would be? Well, that's *exactly* what the average Indian has to live on. (Remember, the $2,800 number is PPP adjusted, so price differences have already been ironed out.) Cut your budget down to $1,000, and you get an approximate idea of how the average Zambian lives. *This* is poverty. A material standard of living that is hardly imaginable, even inconceivable, in even the poorest corners of the United States, is how the great bulk of the world lives right now.

Now, I'm not trying to "shock" you. What I'm trying to do is impress on you the importance of these figures, that they're not just numbers with zeroes attached, some bigger, some smaller. They are meaningful and important. They translate into toothbrushes and shirts, and give you an overall picture of material well-being, of standard of living, in different countries. More importantly, you shouldn't just lump the world into "haves" and "have-nots". Notice that there is a vast difference between India's $2,800 and Mexico's $15,000, even though both are considered "poor" relative to the United States, and sometimes lumped together as "underdeveloped" countries, there is a fivefold difference between them – Mexicans have five times as much stuff as Indians. An average Mexican income level (again, at US prices) isn't very comfortable, but it is manageable. A Ukrainian income is half that, considerably tougher. But the Ukrainian standard of living is, in turn, more than double the Indian, and the Indian double the Zambian.

I also want strenuously to avoid your lumping extremely contrasting countries together. For instance, it has been common, in recent years, for newspapers to talk about Japan and China in the same breath, as if they were economic equals – indeed, it is very tempting, giving how fast China has grown lately. But look at the continuing difference between them. Japan is six times richer. China has still a lot of growing to do before it reaches Japan's heft.

PROBLEMS WITH GDP PER CAPITA

There are several problems with the using GDP *per capita* as a measure of prosperity or standard of living of a country.

(A) ***Inequality*** Firstly, GDP per capita says nothing about income **distribution**. Just because GDP per capita is $47,000, that *doesn't* mean the average American gets $47,000 worth of stuff every year.

e.g. If Bill Gates were to walk into the room right now, GDP *per capita* in this room would increase enormously. We'd all be billionaires by the GDP per capita measure, even if everyone but Bill is on the brink of poverty.

So comparing GDP per capita and talking about the "average Korean" or the "average Indian" (like I just did before) is a bit misleading. To get a 'fuller picture' of a society, it is common to combine reporting the GDP per capita with measures of income distribution within that society.

The most popular measure of inequality is the **Gini Coefficient**, which uses a somewhat complicated mathematical formula to distill distribution into a single index number. The greater the Gini number, the greater the inequality of income distribution; the lower the number, the more equal it is.

Here are some inequality measures, using the same sample of countries in the table above (ranked in GDP per capita order):

Country	Gini coefficient
US	40.8
Netherlands	30.9
Australia	35.2
Germany	28.3
Japan	24.9
Greece	34.3
South Korea	31.6
Saudi Arabia	N/A
Portugal	38.5
Croatia	29
Russia	39.9
Mexico	46.1
Malaysia	49.2
Brazil	57
South Africa	57.8
Jamaica	45.5
Ukraine	28.1
China	46.9
India	36.8
Ghana	40.6
Zambia	50.8

Bangladesh	33.4
Malawi	39

From a glance, it seems like the Gini coefficient is all over the place. Some rich countries (e.g. Germany, Japan) have very low Gini (and thus low inequality), but the richest on our list, the US, has more inequality than the top half of the chart. Inequality also looks pretty high around the middle – with Brazil and South Africa posting some particularly high numbers. The poorer end looks also quite unequal.

In the 1950s, the economist Simon Kuznets posited the hypothesis that the relationship between income and inequality followed an inverted u-shaped pattern (also known as the "**Kuznets Curve**") for the evolution of inequality. That is, very poor societies are relatively equal, inequality rises in the middle (esp. in process of industrialization), and then, after becoming rich, inequality falls again (as a result of the introduction of the kind of social programs and social mobility only rich countries can afford.)

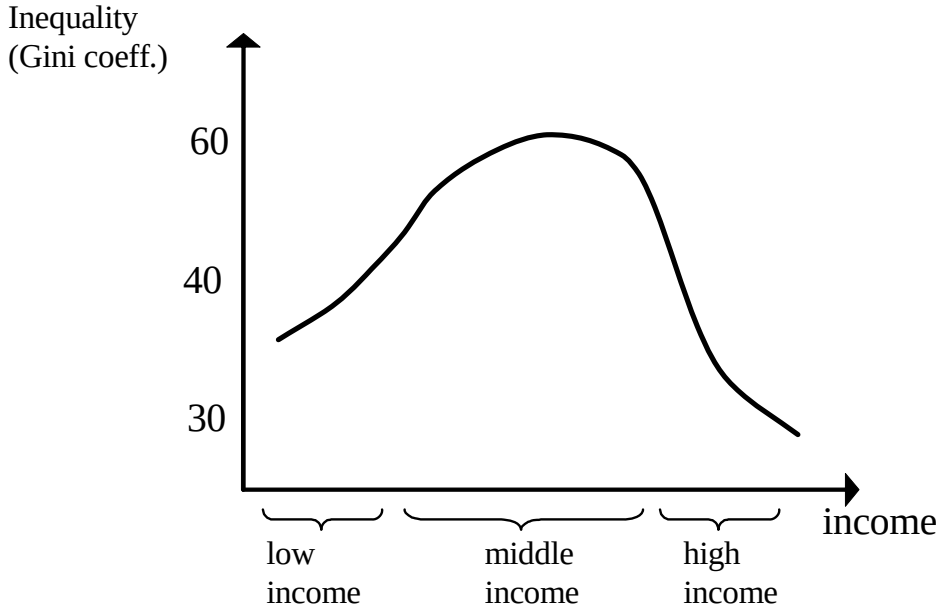


Fig. – Kuznets Curve

Whether the Kuznets hypothesis really holds has been much debated and examined. Indeed, our little sample, which has some of the poorest countries registering high inequality numbers, seems to cast doubt upon it. Of course, that is partly a result of our selection. A wider sample of countries might show the pattern a little more clearly, although, even so, perhaps not clearly enough. The Kuznets hypothesis is suggestive, but still quite contested.

(B) ***Household Dependents*** The second problem with the GDP per capita measure is that it is a really *bad* measure of a **household's income**. We are dividing GDP by population size. That includes children, students, stay-at-home spouses, retired people, etc. who do not work and thus are not actually earning anything. But the GDP per capita measurement doesn't take that into account. It tells us to expect the average family (say of four) to be making

$47,000 × 4 = $188,000 per year. That is way off -- even for such a crude measure. A family will usually have only one or two earners, the others are dependents who earn nothing.

So a better approximation is to calculate *output per earner*. Or, in economics lingo, *productivity per laborer employed*.

> **Productivity (per worker):** amount of goods and services produced by an employed worker (GDP divided by the size of the labor force).

This is a better measure of household income. Currently, output or income *per worker* is calculated to be around $64,000 in the United States, considerably higher than the *per person* number.

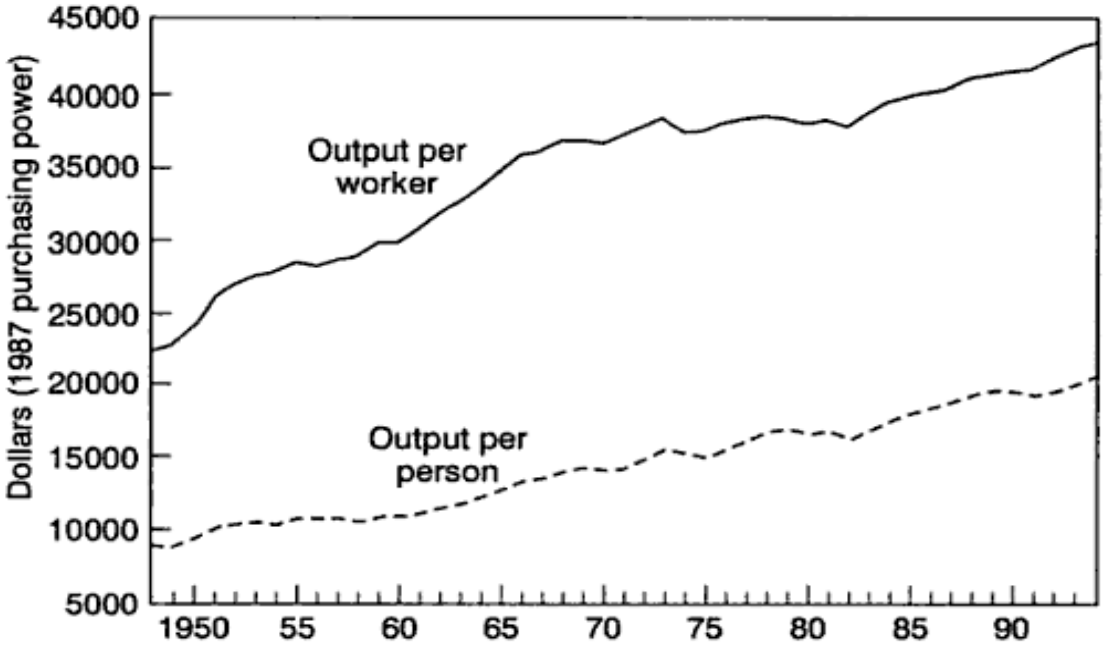


Fig. - GDP per worker vs. GDP per capita, 1948-1994
[Source: T.I. Palley, 1998, *Plenty of Nothing*]

Using the same selection of countries as before, we see that GDP per worker is different:

Country	Productivity per worker
US	$63,783
Netherlands	$46,737
Australia	$49, 644
Germany	$42,639
Japan	$45, 687
Greece	$37,787
South Korea	$39,628

Saudi Arabia	$27,881
Portugal	$30,072
Croatia	$24,295
Russia	$17, 850
Mexico	$19, 635
Malaysia	$25, 091
Brazil	$12,773
South Africa	$11,984
Jamaica	$9,127
Ukraine	$11,124
China	$9, 574
India	$7, 124
Ghana	$3,495
Zambia	$1,833
Bangladesh	$3,587
Malawi	$1,546

(C) ***Unrecorded Activity***

GDP measures only recorded economic activity on official markets. It ignores work that contributes to standard of living but goes unrecorded. Most notably, it fails to measures the "**informal**" sector (or "underground" or "black market") of the economy. That is, activities where work and transactions occur that are simply not observed or recorded by the government.

Unrecorded activity includes not only outright illegal transactions (smuggling, drugs, etc.) but, more importantly goods and services exchanged without receipts or records (e.g. food sales from private gardens, street markets, peddling, day labor, babysitting, etc.). For wealthy countries, the informal sector is only a minor part of overall economic activity – maybe just 5-10%. But in poor countries, the bulk of many household's incomes, if not all of it, comes from the informal sector. Even for middle-to-high income countries, like Russia, the informal sector is estimated to account for as much as 50% of all activity.

Another type of unrecorded activity is, of course, **household labor**, that is labor that is not only unrecorded but also unpaid. Whether families growing their own food on their own plots, or the house-cleaning and child-rearing services provided for free by family members (esp. females) worldwide. This too is unrecorded and substantially affects standard of living.

None of this is captured in GDP per capita. Clearly this should temper your enthusiasm for those numbers. As a general rule, poorer countries look "poorer" in official numbers than they really are.

(D) ***Leisure***

Perhaps the most unsatisfactory aspect of GDP per capita is that it misses out a rather important good**:** ***leisure***. A person's "standard of living" depends not only on the amount of

goods and services he has access to; it also depends on whether he has time to enjoy them (and other good things in life).

We can make a lot of money and get a lot of goods by working 20-hour days, seven days a week. Both GDP per capita and output per worker numbers would shoot up -- but our standard of living would be seriously marred by lack of sleep and exhaustion.

So economists (and politicians) make a big hoop-la about a related figure, *output per hour worked*, or:

> **Productivity (per hour)**: the amount of goods and services produced by a worker in an hour.

This is calculated by dividing GDP by the amount of labor hours clocked by workers throughout the economy. This is what most people mean when they say "productivity".

Currently, US productivity stands at around $36 per hour worked [In contrast, Japanese and German productivity are at $29 per hour, the middle of the scale at around $10, while at the bottom end of the scale, we have China and India hovering around $4, and the poorest countries, like Zambia and Bangladesh, circulating around $1.]

Now we're getting an even better measurement of standard of living. At a productivity rate of $36 per hour, a person working a 20-hour day can expect to produce $720 a day; a person working a 8-hour day can expect to make $288. But the "standard of living" (goods *plus* leisure) of the first is *not* more than twice the amount of the second.

So a country *can* have low GDP per capita and even low productivity per worker, but still have a relatively high standard of living because its productivity *per hour worked* is high.

It is highly instructive to compare GDP per capita with Productivity per hour:

Country	GDP per capita (PPP-adjusted)	Productivity per hour
US	$46,859	$35.63
Netherlands	$40,431	$32.96
Australia	$35,677	$28.77
Germany	$35,442	$29.49
Japan	$34,100	$29.15
Greece	$30,535	$18.98
South Korea	$27,647	$18.18
Saudi Arabia	$23,834	N/A
Portugal	$22,190	$16.47
Croatia	$18,545	$13.45[a]
Russia	$15,922	$9.84[a]
Mexico	$14,560	$9.19
Malaysia	$14,072	$11.04[a]
Brazil	$10,326	$7.99
South Africa	$10,119	$6.17[a]
Jamaica	$7,766	$4.92

Ukraine	$7,347	$5.62 [a]
China	$5,963	$4.7[a]
India	$2,762	$3.4[a]
Ghana	$1,452	$1.74 [a]
Zambia	$1,399	$0.91 [a]
Bangladesh	$1,344	$1.4[a.]
Mozambique	$897	$0.78 [a]

a – estimates drawn from various sources + wildcat guesstimation = non-reliable, but approx.

Notice that although there is some slight variation, productivity per hour is highly correlated with GDP per capita. Countries may have more workers or less, work longer or less, be more equal or more unequal. But if you want to pin down the prime determinant of standards of living, it seems relative productivity per hour is pretty much paramount.

Productivity per hour is the Holy Grail of economic prosperity. A nation may be equal or unequal, labor participation may be high or low, hours worked may be long or short. Increasing any of these imply drawbacks in other areas (exhaustion, less leisure, other activities such as housework go undone, etc.) But increasing the amount produced *per hour worked* is all good. There seems to be no drawback. If you can raise productivity per hour from $3 per hour to worked to $30 per hour worked, you are not compromising anything else in your life. You get ten times more stuff for the same effort. We can safely say that, on material grounds, your standards of living have improved tenfold.

PRODUCTIVITY & WAGES

It is an empirical fact that productivity per hour is extremely closely correlated with wages. You will invariably find that the more a worker produces in an hour, the more he gets paid per hour.

This should make sense. The average American worker produces output worth $36 in an hour. That output is owned & sold by the firm. From the proceeds of the sale, those $36 will be distributed to landlords, shareholders and workers as rents, profits and wages.

The *greater* the productivity, the *more* there is to distribute. Consequently, it should not be surprising when productivity rises, wages rise.

e.g. suppose the $36 are distributed so that $20 go to pay wages, $10 to profits and $6 to pay rents.

Suppose productivity rises from $36 to $40. What does the firm do with those extra $4? Well, suppose a firm decides to keep them as profits. So, wages stay at $20, rent stays at $6 and profits rise to $14.

But then competition comes into play. *Another* firm can easily come in and *steal* the first firm's workers by offering them higher wages (say, $22 per hour). Their profit is now merely $12, but that is still an increase and thus still worthwhile.

In sum, competition among firms for labor ensures that when productivity increases, wages tend to increase (and profits and rents *also* rise) across the board. Increasing productivity is the most reliable way of increasing wages there is -- it really doesn't "force" the firm to lower profits to grant them wage increases. When firms can *afford* to pay their workers more, competition ensures they probably *will* pay more.

This makes productivity numbers great predictors of standards of living of "average" people. That's why, as Paul Krugman once wrote, "Productivity isn't everything, but in the long run, it is almost everything."

An Aside: "Cost Disease" in Services

The fact that firms in different sectors compete for a single pool of workers means that higher productivity in *one* sector may lead to higher wages *overall* -- even in sectors where productivity does *not* increase. This leads to a phenomenon known as "**cost disease**" in service sectors in industrialized countries.

Many sectors, particular those for "personal services", usually have little or no productivity gains. It takes a barber one hour to cut somebody's hair. Its been like that for centuries and will probably remain like that for centuries to come. A more "efficient" pair of scissors will probably not increase the hair-cutting productivity of the average barber all that much.

But the fact that *other* sectors (e.g. automobile production) have experienced productivity gains means that haircuts become more expensive over time. Why? Because if the barber's "wage" doesn't rise *pari passu* with the wage of an automobile worker, he will quit the barber shop or hair salon and take up employment in an automobile factory. So the owner of the salon will be "forced" to pay him a higher wage just to keep him where he is. But since the barber is not any more productive, the hair-salon will have to pass on its higher wage costs in the form of higher prices for haircuts.

So, the rising productivity of *some* sectors like manufacturing, IT and the like, has led to the rise in the *prices* of services. That is why things like haircuts, childcare and college tuition get more expensive over time -- and "unreasonably" so, as barbers, nannies and college professors are probably no more productive than before.

Another aside: Productivity & Class War

Income distribution is one of the most-fought things in history. Workers and peasants want higher wages, capitalists want higher profits, landlords higher rents. It is an age-old political idea that one can only be gained at the expense of the other, that "class war" is endemic in society.

In many countries and many epochs, this confrontation has frequently turned violent. Proletarian mobs raise barricades, peasants grab their pitchforks, landlords and capitalists deploy their cavalry guard or constabulary, and the whole quarrel ends up with heads cracked or chopped. Plenty of blood has been spilled in city streets and rural meadows as the various parties face each other off in an effort to get or defend their "fair share" of the pie.

These fights are particularly acute in poor societies with low productivity. But look at the absurd crumbs they're fighting over. Suppose a society has a productivity rate of $4 per hour. Suppose income distribution is such that $2 goes to wages, $2 to profits & rents. A street revolution may, at best, shift the distribution a little one way or another. It might, say, raise the share of wages to $2.25 and reduce the share of profits to $1.75. For this 25-cent improvement in wage income, so much blood is spilled. A huge human price for such a small material gain.

Yet if income distribution was disregarded, and effort was thrown instead into improving productivity from $4 to $5 per hour, *both* workers and capitalists would see their incomes increase by 50-cents each, far greater gains than they could achieve by beating each other bloody on city squares. The *need* for street-fighting to improve your well-being would be much less urgent.

So boosting productivity growth is not only great in itself, it has perhaps been one of the greatest instruments for the preservation of social peace mankind has ever devised.

PRODUCTIVITY OVER TIME

Productivity Growth

If productivity per hour is measured as GDP divided by labor hours worked, then productivity *growth* is measured as GDP growth *minus* the growth of labor hours. Or:

Productivity growth = GDP growth - growth of total labor hours

Productivity growth is a good indicator of the rate at which wages (and standards of living) are increasing over time.

Now, the growth of total labor hours is very dependant on things like the growth of population (more population means more laborers and thus more total labor hours in the economy). So a short-cut measure is to simply define productivity growth as GDP growth minus population growth. Notice also the implication that the *faster* population grows, the *slower* productivity grows.

So, productivity growth is often regarded as a "race" between growth of output and growth of population. To get standards of living to rise, output must grow *faster* than population. If population grows *faster* than output, then productivity (and thus standards of living) will decline.

Productivity in History

One of the most astounding things that economic historians have emphasized is how very *much* productivity per hour has grown this century. In 1900, US productivity was about $4 per hour (measured in current real dollars). In other words, our productivity per hour -- and thus our average standard of living -- is about *ten times* greater than our great-grandparents. That's a remarkable -- and unprecedented -- rate of increase.

If this figure doesn't quite astound you, compare it to the *previous* century. In 1820, US productivity per hour was around $1.8 per hour. So, in the eighty years between 1820 and 1900 -- the heyday of industrialization era -- productivity *only* doubled. But in the hundred years after that, productivity increased *ten* times. We've had an astoundingly productive century!

What about before 1820? Well, it might surprise you even more. In western European countries like Britain, France, Germany, Italy, etc. *productivity per hour did not increase at all* between the fall of the Roman Empire in 476 AD and the fall of Napoleon's Empire in 1815! That's 1,300 years of *absolutely no improvement* in average standards of living!

A famous historian once commented that "Napoleon's armies moved no faster than the armies of Julius Caesar". Indeed. To which we can add: "and Napoleon's subjects probably lived no better either".

It should also impress another lesson: raising productivity is *difficult*. Many a lazy public commentator likes to explain poverty and prosperity by simple factors – politics, education, even 'culture' and some-such nonsense, and that simply twiddling with this or that will make all the difference. But the last two thousand years have seen all sorts of different political structures, policies, cultures, et al., all of them yielding up much the same dreadful results of low or zero productivity growth.

Productivity growth isn't something that happens easily. The industrial revolution of 1820-1900, which merely doubled productivity from a miserable $1.8 to a still-miserable $4 was *painful*. It required turning society upside down, wiping out traditional ways and modes of doing things, dragging people out of their homesteads into harrowing slums, and spilling a lot of blood in the process through uprisings, riots, revolutions and wars to make the changes stick.

Yet today, productivity improves at a rapid pace. Productivity gains that used to take all the king's horses and all the king's men decades to accomplish, some societies now achieve on a yearly basis, without anyone much noticing it.

What seemed so difficult long ago, looks so easy now. For some anyway.

So just from historical facts, there seems to be some sort of threshold barrier, where initial productivity gains are very difficult, requiring much effort and dramatic changes, but once this hump is passed, productivity gains just come easily. Or put another way, increasing productivity from $1 to $5 seems to be really hard and painful, requiring great deliberate and revolutionary efforts to achieve. But going from $25 to $29 seems so easy and smooth, almost inevitable.

The Productivity Slow-Down

How have we been doing lately? From 1945 to 1975, productivity grew at an average rate of 3% a year in the US. For the reasons explained before, average standards of living grew at about that same rate. That is a pretty darn good pace of increase (especially if you consider the virtually 0% rate of increase of the previous 1,500 years!)

But, from 1975 to 1995, that number collapsed by half. Productivity grew at a rate of merely 1.5% per year. That is not nearly as good.

[The difference between 1.5% and 3% per year may not seem like much, but when **compounded** over time, it is a tremendous difference, 3% on top of 3% on top of 3% adds up to a lot really quickly. e.g. starting with $100 in the year 2000, then we can compare the different results of sustained 3% and a 1.5% *per annum* growth rates as follows.

Year	3% p.a.	1.5% p.a.
2000	$100	$100
2001	$103	$101.5
2002	$106.1	$103
2003	$109.3	$104.6
2004	$112.6	$106.1
. . .	. . .	. . .
2010	$134.4	$116.1
2020	$180.6	$134.8

The difference is stark already in a decade and only get larger and larger. To see the difference another way, if your income grows at 3% a year, you can expect to *double* your income in about 23 years. If your income grows at 1.5%, it will take 47 years to double it.]

The productivity slow-down that began in the 1970s translated itself into a slower rate of income growth -- and a rather gloomy overall mood as Americans were finding themselves getting fewer and smaller pay rises, etc. There was much talk about how the new generation would have to lower its expectations, that they ought stop imagining that their standards of living would rise as quickly or as much as their parents' had enjoyed. Paul Krugman referred to it as the "age of diminished expectations".

People everywhere puzzled over the slow-down. Many pointed the finger at the OPEC oil price hikes. That seemed true for a while. But when oil prices came back down during the 1980s, productivity growth *still* failed to pick up.

Unkind commentators blamed the "lazy" American workers, unwilling and unable to compete with the much-feared Japanese. But the productivity slow-down was not an exclusively American phenomenon -- it plagued the entire industrialized world – Europe, Japan et al.

Many just shrugged their shoulders. It was, they argued, simply the end of the exceptional post-war era. After all, historically speaking, 3% productivity growth was a rare achievement. The "slow-down" was just our returning back to "normal".

But just as everybody decided to lower their expectations, productivity growth came roaring back. From 1995 onwards, productivity has been increasing at an average rate of 2.5% per year. Still not quite like the earlier 3%, but better than what we had more recently.

PRODUCTIVITY GROWTH

How does productivity increase? Well, we have to go into the mathematics of the formula $Y = f(T, L, K)$.

e.g. returning back to our old example, we had 3 acres of land, 12 labor-hours and 6 units of capital and a particular technology formula (f) and we figure out that produced a total output of 60 bushels of wheat, i.e.

$$f(3, 12, 6) = 60.$$

Now, if I *divide* all the inputs by 12, I obtain:

$$60/12 = f(3/12, 12/12, 6/12)$$

or:

$$5 = f(1/4, 1, 1/2)$$

which, using our letters, can be rewritten as:

$$Y/L = f(T/L, 1, K/L)$$

Y/L is the *output per labor hour***,** i.e. productivity. So, in our example, productivity is 5 bushels per hour worked.

Our next temptation is to see what happens what the economy grows. Consider factor-augmenting growth. Let us double all our factors as before (so T = 6, L = 24, K = 12). We know in this case:

$$f(6, 24, 12) = 120$$

So, dividing through by labor-hours (= 24):

$$f(6/24, 24/24, 12/24) = 120/24$$

or:

$$f(1/4, 1, 1/2) = 5$$

i.e. productivity *remains* 5 bushels per hour. So simple factor-augmenting growth does *not* translate into productivity growth. So productivity doesn't just grow automatically by the simple, natural growth of resources. In other words, just because the economy grows does not mean productivity grows.

What about growth by technological progress? Here we changed our technique from *f* to *f** which, recall, gave us:

*f**(3, 12, 6) = 72

Dividing through by labor-hours (= 12), we obtain:

*f**(3/12, 12/12, 6/12) = 72/12

or:

*f**(1/4, 1, 1/2) = 6

Aha! Productivity *has* grown now, from 5 to 6 bushels of wheat per hour. Clearly, growth by technological progress *does* improve productivity.

But is technological progress the *only* way to increase productivity? Not quite. Just from the productivity formula, Y/L = *f*(T/L, 1, K/L), notice that productivity is a function of that K/L thingy. This is the *capital-labor ratio*. If we increase it, we may be able to increase productivity.

Let us try. Remember that our technology *f** = "one worker with one hoe, another worker running around filling mounds & chasing crows". Well, notice that the second guy is filling the mounds *by hand*. Not very efficient. Why not give him a shovel?

So, let's change our economy by building six shovels and giving distributing it among our workers. If we do that, our total resources become T = 3, L = 12 and K = *12*. The only number that has changed is capital (K = 6 hoes + 6 shovels = 12 capital goods). The others remain as they were. Of course, the formula needs to be adjusted slightly (call it *f***):

> *f*** = "one worker with one hoe, another worker with a shovel filling mounds behind him and chasing crows, on a half-acre of land, produces 14 bushels of wheat"

So, applying this formula six times to our resources we obtain total output of 84 bushels (6 x 14). Or, summarizing:

*f***(3, 12, 12) = 84

So, in terms of productivity (dividing by L = 12):

*f***(1/4, 1, 1) = 7

We produce seven bushels per worker. Productivity *has* increased!

What's happened? Our first temptation is to say "Oh, we're using a new formula, so this is just technological progress again". But no, it isn't. Strictly speaking, it isn't technological "progress" since we are not using the *same* factors to produce *more* output. We've *added* factors (6 shovels) and just adjusted our formula to reflect that.

(Also: *f*** isn't necessarily a new recipe "invented" just now. That recipe might have been available to us before, but as we didn't have any shovels available before, we couldn't apply it before.)

But it is not simply growth by "factor augmentation" either as we are not increasing *all* factors (land and labor stayed the same) but only one (capital).

What we have done is increased *one* factor (capital) and just applied a formula that fits the new factor proportions. It's not "progress" nor "factor-augmentation", but rather what is commonly called "**capital-deepening**" or "**capital-formation**".

So capital-deepening *increases* productivity.

Now, a few caveats must be appended:

Firstly, capital-deepening is not *merely* increasing capital. It is increasing the capital-labor ***ratio***. If population grows *and* capital grows at the same rate, then (as in the factor-augmentation case) the capital-labor ratio is unchanged and so productivity does *not* rise. Now capital and labor can grow over time. To increase productivity we need to make sure that the capital grows ***faster*** than labor. *That* is capital-deepening.

Secondly, since capital-deepening is about increasing the *ratio* of capital to labor, then there are really two ways of doing this: increase the growth rate of capital (speed-up hoe- & shovel-building) *or* decrease the growth rate of labor (reduce labor growth). So a ***reduction*** in population growth will have a similar effect as an *increase* in capital growth.

Thirdly, would increasing land-labor ratio by "land-deepening" have the same effect on productivity? Yes, but since it's really hard to increase land, land-deepening is not usually a very significant possibility (remember we should probably regard land as fixed).

GROWTH POLICY

So, in sum, we have identified *two ways* productivity can be increased:

(a) **technological progress** (better *f*)
(b) **capital deepening** (increasing K/L)

It might be worthwhile asking first which is more significant, (a) or (b)? There is an entire area of economics literature -- known as "**growth accounting**" that tries to break down productivity growth into these two components. Recent studies show that, for the United States:

-- of the 3% productivity growth rate of the 1945-75 period, 2% was due to technological progress and 1% to capital-deepening.

-- of the 1.5% productivity growth rate of the 1975-1995 period, 0.5% was due to technological progress and 1% to capital-deepening.

-- of the 2.5% productivity growth rate of the 1995-now period, 1.2% was due to technological progress, 1.3% was due to capital-deepening.

The first thing you'll notice is that capital-deepening was roughly the same throughout (increasing slightly in the 1995-period). Technological progress, on the other hand, yo-yo'd a lot -- from 2%, down to 0.5%, up to 1.2%. This tells us that technological progress may be the prime determinant of *swings* in productivity growth.

So let us turn now to the question of what can a government *do* to encourage either (or both).

(1) Capital-Deepening

We have noted two ways of increasing capital-deepening: you either increase capital growth, or decrease labor growth.

In terms of policy, which is easier, increasing capital growth or decreasing labor growth? Well, we have already posited that labor growth tends to be hard to manipulate -- so much is dependent on biology, culture, etc. -- and, even if we can change it, the effects won't show up for a while.

So, if you want to increase productivity quickly by capital-deepening, your better bet is to aim for increasing the growth rate of capital, i.e. promote investment.

(2) <u>Technological Progress</u>.

"Technological progress" -- i.e. new recipes -- is a difficult but not impossible thing to "encourage" by policy. How do you get a person "come up" with a new formula? Well, you can't really. Innovation is not something you can order a person to do and they'll do it. Human inventiveness & creativity is something that is part psychology, part culture, part experience, part necessity. And, even if all those stars are aligned properly, there is no guarantee something new will be invented.

Although there is no buttons a government can press to make people innovate, it can try setting up the right environment for them.

(a) **Competition policy**: Entrepreneurs are an inventive bunch but (like all of us) they're also lazy. If they don't *have to* be innovative, why should they bother trying? This is where competition plays an important role. If a mousetrap-producing firm has a monopoly position, they can just sit back and rake in sufficiently large profits to keep themselves happy. They have little or no incentive to make a better mousetrap -- or figure out new ways to combine their resources to make a mousetrap cheaper to produce. But if other mousetrap-producing firms are set up, competition will eat away at those excessive profits. With their falling profit margins, the threatened entrepreneurs will spring into action and start being inventive. So a government that *encourages* competition domestically (e.g. by breaking up monopolies, encouraging small businesses, etc.) or bringing in foreign competition (opening markets) might help technological progress along.

(b) **Patent protection** With patents, governments give innovators a monopoly over their inventions for a period of time. Patents are thus, by design, *anti*-competitive. *However*, the lure of monopoly profits (even if for a limited amount of time) may give an inventor an *incentive* to invent something. Many inventors simply won't bother to invent if they feel their ideas will be stolen immediately. So, patent policy tries to strike a balance -- ideas are protected for a time to give inventors an incentive to invent a better mousetrap, but not for so long that they no longer need to invent an even better one after that.

The question of how long is the ideal "length" of a patent, however, is a bit harder to estimate. Many people complain that the current laws are unbalanced, that owners of patents are given too long a monopoly. Also much debated recently is the issue of patents on pharmaceutical products (esp. AIDS drugs). Should encouraging technological innovation (and long-run growth) be more important than curbing a massive life-or-death health crisis?

(c) **Research & Development**: Governments often give tons of money to universities, private and public research centers in the hope that their research will lead (eventually) to technological innovation. There are, of course, questions as to how effective this money is being spent.

(d) **Human Capital**: Humans innovate -- in particular, humans who are generally literate, educated, skilled, etc. tend to be more "able" to innovate. So government spending on education, training and other forms of improvement of "human capital" are seen not only as

a good thing in itself, but also a promoter of long-run growth as it might lead to technological innovation.

Education, in particular, is often advertised as the "key" to helping inventiveness. But, unfortunately, the numbers are not quite so encouraging. Many nations have spent extraordinary amounts of money on educating their populations, but their growth rates don't seem to pick up -- puzzling economists very much.

One argument has it that it really depends on *where* you focus that spending. From my own research years ago, I found that money spent on *secondary* education (junior high & high school) seem to lead to better growth results. Money spent on primary education (elementary school) or tertiary education (college, etc.) made little or no difference to growth rates. Other researchers have found similar results.

These results should not be too surprising since, in order for education to be effective, it should have a *practical* impact on the job. Speaking cold-heartedly, teaching a peasant child how to read (which is usually what elementary schooling is limited to) is probably not going to help him till his fields any better. But teaching him a few more things (as in junior high/high school) may help him move into jobs where literacy and other skills begin to matter more and can put to practical use. An educated clerk is probably going to be a better clerk than an uneducated one, but an educated peasant is probably no better a peasant than an uneducated one.

So, as a policy recommendation, if a government is forced to choose between using its limited education budget to either (A) hire more elementary school teachers so that more people get primary schooling or (B) hire more high school teachers so that those few that already have primary schooling can get secondary schooling as well, it should go for (B).

It's a sad result -- and quite undemocratic, as you will probably be increasing the differences between the illiterate rural poor and the literate urban middle-class. But it's a real choice many poor countries are often forced to make.

(What they definitely *shouldn't* do is spend their limited money on tertiary education. I've raked over those figures several time, but again and again I come up with the same result: in terms of impact on growth, money spent by governments on expanding access to advanced training & college is often money wasted in productivity terms.)

I also found that money spent on the education of girls was more effective in encouraging future growth than spending it on boys. This is a bit more heartening, from a democratic perspective. But why is this so? One possible explanation is that educated girls have more "externalities" than educated boys. For better or for worse, in most traditional societies, when grown up, women tend to be more responsible for the raising of children than men and so their own education will probably be filtered to them. In other words, when you educate a boy, you end up educating just one man. But when you educate a girl, you end up educating a whole family.

Conclusion: if you only have enough money to build one school, make it a high school for girls.

(e) Learning-by-Doing. It is a simple fact that, for the most part, people learn more skills on the job than they learn in a classroom and that the very act of working with stuff makes you think about ways of improving upon them. Exterminators have probably better ideas about how to make a better mousetrap than students sitting in a class called "Theory of Mice and Men, 101". Not always, but nearly so. Of course, education helps in "laying the ground" for innovation -- an exterminator capable of reading the trade newspaper about other people's attempts will probably come up with a better mousetrap than an illiterate exterminator -- but education is not really a substitute for on-the-job learning.

The *kind* of job a person has *matters* here. A factory worker who works on a complicated machine learns not only how to operate that machine, but, in the course of his job, he will also learn a few things about how to tinker with a machine and the principles of mechanics more generally. These skills will not only make him more capable of innovating himself, but also make him flexible and adaptive to newer techniques & new machines.

But a peasant who's only tool he ever uses is a simple wooden hoe is not going learn many new skills from it. And will probably find it quite hard to adopt any newer techniques or equipment, even if they're introduced to him. A factory worker's skills improve over time and make him more receptive to innovation than a peasant worker.

If the mere use of machinery (i.e. capital) *helps* technological innovation, then capital-deepening (increasing capital-per-worker) has a double-whammy on productivity growth: it not only helps productivity growth by itself (as we saw), but by improving worker skills via learning-by-doing, it also lays the ground for more technical innovation. Clearly, capital-deepening has lots of nice effects.

So increasing capital -- i.e. *investment* -- seems to be the magical key to improving productivity. It is no surprise that governments have focused immensely on it.

GROWTH AND DEVELOPMENT

Let us summarize where we are at:

We started off asking about what determines the economy's *capacity* to produce goods. We concluded that it had to do with the *amount* of resources (i.e. land, labor and capital). But we also contended that:

(a) Land can be regarded generally as "fixed".

(b) Labor, in the long run, grows rather slowly and at a rather independent rate of its own, governed by very slow-changing factors like biology, health, culture, education, etc.

(c) Capital grows because of firms' investment decisions. These in turn, are based on very immediate concerns, like estimation of demand and interest rates.

Clearly, if we want to *increase* the economy's resources quickly, the easiest avenue is to increase investment spending.

Furthermore, if we can get capital to increase *faster* than labor increases, then productivity increases and standards of living rise.

This is *growth.*

But is it *development*? Is the difference between a rich country and a poor one the mere fact that one has a high productivity and the other a low one? Is that difference reducible to the fact that a rich country has a high capital-per-labor ratio and the poor country has a low one? And can underdevelopment be "fixed" by simply jacking up the capital-labor ratio?

Development as Growth: the "Big Push" Theory

From the 1940s to the 1960s, the consensus among economists was that growth and development are virtually one and the same thing. The process of "development" was identified merely as the attempt by a nation to increase its capital-labor ratio, i.e. to accumulate capital at a faster rate than population, so that its income per capita would "catch up" with the industrialized world.

Unsurprisingly, during this time, governments concentrated on figuring out ways to encourage capital formation in development countries. The "Big Push" theory was advocated by some of the most famous development economists of the era -- like Ragnar Nurkse (1952), W. Arthur Lewis (1954) and Gunnar Myrdal (1957).

The problem of poor countries, they diagnosed, was simply that local firms weren't undertaking investment projects because, for some reason, they thought the return on the

investment was too low and/or the cost of borrowing funds was too high. To get investment going, they argued, a two-pronged approach was needed to "fix" this situation:

(1) The return on investment, as we know from the accelerator process, is dependent on demand growth. But if a country isn't growing, then we're at an impasse. The vicious cycle of low growth & low investment repeats itself over and over again. Economists believed the government could break the cycle and jump-start growth, i.e. they can *make* demand rise by having more **government spending** in the economy. Once they see demand starting to rise, firms will start undertaking investment projects, which will generate more growth, etc. The vicious cycle is turned into a virtuous one. Furthermore, if that spending by the government is itself concentrated on building up physical capital and infrastructure (e.g. dams, ports, roads, etc.) the benefit is doubled.

This why it is often called the "Big Push" theory -- private investment needs a "big push" from the government to get going.

(2) But that's only one side of the equation. The other side, the cost of funds, can be kept low by openness to **foreign lending**, i.e. allow local governments and firms to borrow from abroad at lower interest rates.

That was, roughly speaking, the "development plan" of Big Push theory: have the government increase the return on investment, and foreign lenders lower the cost of funds and domestic private firms will do the rest.

What happened?

You can bring a horse to water, but you can't make him drink. And private firm investment is a finicky colt -- and if, for some reason, it doesn't want to drink, it won't drink. And, at the end of the day, in many countries, it didn't.

For many developing countries (e.g. India, Brazil), this Big Push strategy in the 50s, 60s & 70s seemed to fail: private firm investment didn't pick up, and these countries ended up with massive (and very often useless) government projects and mountains of debt (most of it denominated in foreign currency) that it couldn't possibly pay back ("**Debt Crisis**"). They ended up with a much bigger mess than they started out with.

What went wrong? It is difficult to say. Some people accused governments (or those with access to foreign funds) of having borrowed the funds to build rather useless investment projects, or diverted those funds into bank accounts abroad or used it to finance luxury imports for urban consumers. In other words, foreign funds were **misallocated.** They weren't used to increase demand for domestic goods, nor sensible infrastructure projects nor make borrowing any cheaper for domestic firms. The funds were misapplied, siphoned off by politics, corruption, military purposes or vanity projects.

Malthusian Poverty Trap?

Another explanation was that there was that perhaps there was a **Malthusian poverty trap**. Remember that, according to Malthus's theory, higher standards of living generate more fertility.

So, it is possible that the very process of increasing living standards from the Big Push actually *induced* a population explosion which pushed labor supply up as fast as capital (and perhaps faster), therefore nullifying the attempt to increase the capital-labor ratio. In other words, the Big Push defeated itself.

Now, Big Push theorists had anticipated something like this happening but thought they could overcome it. Remember that population theory says that this Malthusian relationship between standards-of-living and fertility is only true *up to a point*; after a certain high level of income, fertility tends to decline again. So, if the surge in investment was big enough, that threshold level can be overcome and the Malthusian poverty trap broken. That is why the Big Push theorists always stressed "a *Big* Push", and not merely "a Push".

So perhaps the Big Push simply hadn't been "big enough"? Many believe this. They argue the big push policies didn't work simply because developing world governments, facing budgetary problems and international payments crisis and pressure from foreign lenders, had been forced to quit half-way.

Others noted that it is not mere amount of capital-deepening that matters, but the *type* of capital-deepening. In this, the role of **trade** becomes paramount (as we shall see later).

Structural Problems?

As the 1960s and 1970s progressed and the promised results of Big Push policy seemed elusive, economists grew increasingly skeptical. Perhaps "Big Push" economists had underestimated or under-researched the task at hand. Perhaps their whole diagnosis was wrong. Big Push theorists had a tendency to view developing countries as merely "pint-sized" versions of developed countries, that the only essential difference between them was that one had a low capital-labor ratio, and the other a high one. Was that perhaps too simplistic?

So skeptics began pressing the point that developing countries have quite different institutions and structural problems of their own. That things like widespread poverty, poor health & illiteracy, large rural-urban divides, unemployment and inequality, government corruption and mismanagement, recurrent political violence and instability, weak rule of law, for instance, throw up challenges of their own and make the where's & how's of investment more complicated.

A simple "Big Push" can't fix everything overnight and might even exacerbate those structural problems. Perhaps a more gradualist, country-specific approach to development, "fixing" these human & structural knots and bottlenecks one by one first, *before* the Big Push is undertaken, is essential to making the Big Push work.

But many economists remained unconvinced of this line of reasoning. After all, many industrialized countries today were once as poor and with all the same structural problems as modern underdeveloped countries. Once they got rich (from a Big Push of their own in the 19th C.), those structural problems just "went away". So, they argued, by themselves, these problems shouldn't be a "barrier" to a Big Push. They are a symptom, not a cause, of underdevelopment.

The Dependency Thesis

But there is one rather important difference between developing in the 19th C. and developing in the 20th C. -- competition from the rich countries. Early industrializers -- like Britain and Belgium -- faced little or no competition from the rich world simply because there was really no "rich world" to compete against them (or because, as in the case of Germany and France, their governments actively made sure the rich world's influence wasn't felt).

But modern developing countries, however, are often trying to develop on their own while *at the same time* integrating themselves into a dynamic world economy by trade. That, they argued, was unprecedented. It's hard enough to grow on your own, but to try growing while a giant is sitting on your shoulders is all but impossible.

This is the kernel of the "**Dependency Thesis**", originally articulated by Raúl Prebisch and picked up by other economists in the 1960s and 1970s.

On the face of it, we should be skeptical. Free trade *shouldn't* be a hindrance to investment and growth. After all, by making foreign markets available to domestic producers, we're bound to see *more* investment, at least in the export sectors. And more investment, of course, means more capital-formation and more potential for growth. So what's the problem?

The problem is that, *in the long-run*, certain industries are better than others for generating growth. Trade means specialization and specialization means that you must pick some industries to concentrate on and drop others. But if you pick the "low-productivity" industries to specialize in, you might be in trouble in the long-run. So, in growth terms, specialization and trade *may* end up causing more problems than it solves.

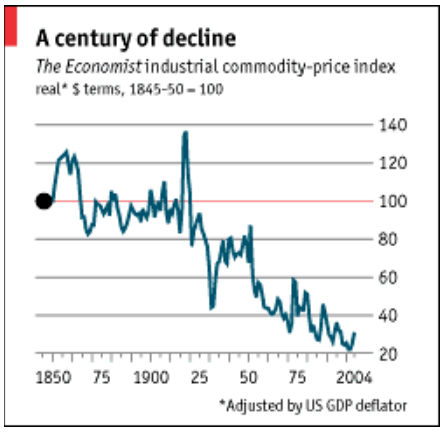
What are the "wrong industries" to specialize in? It is hard to say. But Prebisch drew attention to the problems of specializing in the production of **primary commodities**, i.e. raw materials like cocoa, rubber, coffee, sugar, copper, fuels, etc. In particular --

(1) It was a specialization *imposed* on many countries during the **colonial period** by the metropolitan government, a decision which may have had more to do with the specific needs of the empire at the time than the comparative advantage calculations of local producers in the wider global market. The countries that specialized in primary commodities under colonial regimes tended to *over*-specialize in one or two commodities, giving them **little flexibility** to change direction when world prices changed.

(2) Primary commodity production tends to use little capital and a lot of land and brute, unskilled human labor, meaning the scope for encouraging overall **technical progress** and the development of skilled labor is more limited than, say, capital-intensive industries like manufacturing.

(3) Primary commodity prices are extremely volatile. They **change erratically** from year to year. Not only is living in cycles of feast-and-famine very uncomfortable, it also makes it rather difficult to plan ahead. And with so many people working in commodity production, that means that people's incomes (and thus demand for goods generally) fluctuates a lot. But the accelerator effect tells us that firms need to see a persistent *trend* if they are to be bold enough to undertake investment projects. So, in these countries, investment spending tends to be rather low.

(4) If we look through this erratic thicket to look for the overall trend of commodity prices over the really-long-run, it is not encouraging: prices of primary commodities have suffered a **declining overall trend** over the past century. The export earnings of countries that specialized in the stuff have eroded -- as have the incomes of most of the people who work in them. And, as overall demand falls over time, well, you know how firms will react.



Taken together, dependency theorists concluded, these specializations have in the long run, served these countries poorly. And free trade simply reinforces these specializations. With trade, the world will encourage a "center-periphery" relationship among nations, where the Third World regresses even further into becoming the producer of commodity raw materials for First World manufacturers and are thus condemned to a peripheral, dependent and increasingly poor role in the world economy.

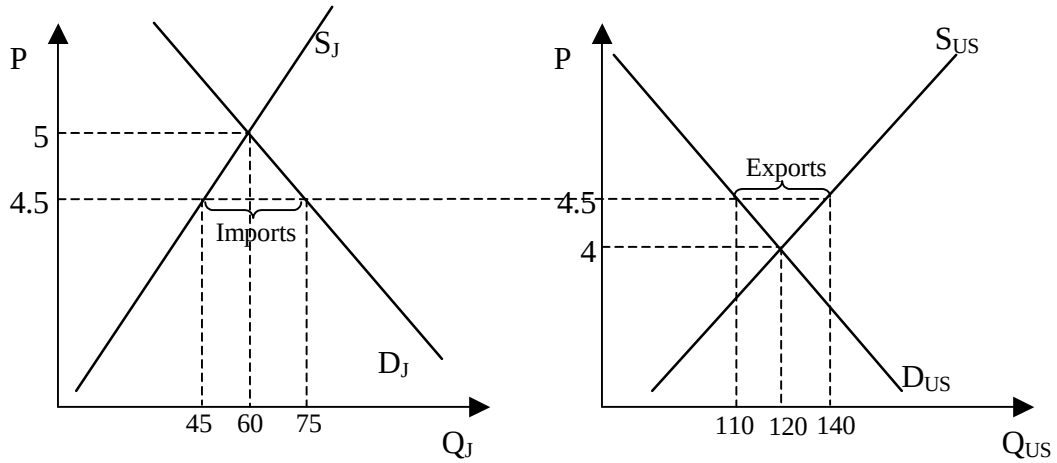
As a policy conclusion, dependency theorists argued, some degree of **protectionism** in trade was necessary if these countries were to enter a self-sustaining development path. Import-substitution, enabled by protection and government policy, rather than trade and export-orientation, was the preferred strategy. Of course, it is not that everybody should specialize in manufacturing. But the ideal, to use a common catchphrase, was that countries should aim for "balanced growth", nurturing various sectors, commodities *and* manufactures, a measure of diversification to lower the risk of disaster when world prices change.

GROWTH & TRADE

The dependency thesis may seem confusing. After all, hadn't we proved before that specialization and trade was a many-splendored thing. Yes, we know sectors *within* a country may lose out (Stolper-Samuelson), but certainly we held that that the country *as a whole* would be better off. Why are we changing our tune all of a sudden?

Because the "gains from trade" we went on about were *one-time* gains. We are now talking about whether these gains *persist* over time. With growth, the demand and supply curves *change*. And the resulting international price *will change*.

Consider our classic US-Japan computer market example. Recall that the Japanese domestic price of computers was 5 stereos per computer and US domestic price of computers was 4 stereos per computer. We posited that, when they traded, the price of computers would settle at 4.5 stereos per computer and Japan would import 30 computers from the US -- and would have to pay for them by exporting 135 stereos (= 4.5 x 30) to the US. In our diagram this was something like this:



Japanese Computer Market American Computer Market

So far, so good. But now let's suppose *growth* happens -- i.e. land, labor and capital increase. As a result, there's more supply of everything and more demand for everything. That means that *both* the American and Japanese supply of computers will increase (as there are more resources to build computers) and *both* the American and Japanese demand for computers increases (as there are more Japanese & American consumers). That is represented by the supply curves and demand curves in *both* countries shifting to the right. We see the new positions depicted in red below. (I know it can be a little confusing to look at, but bear with me).

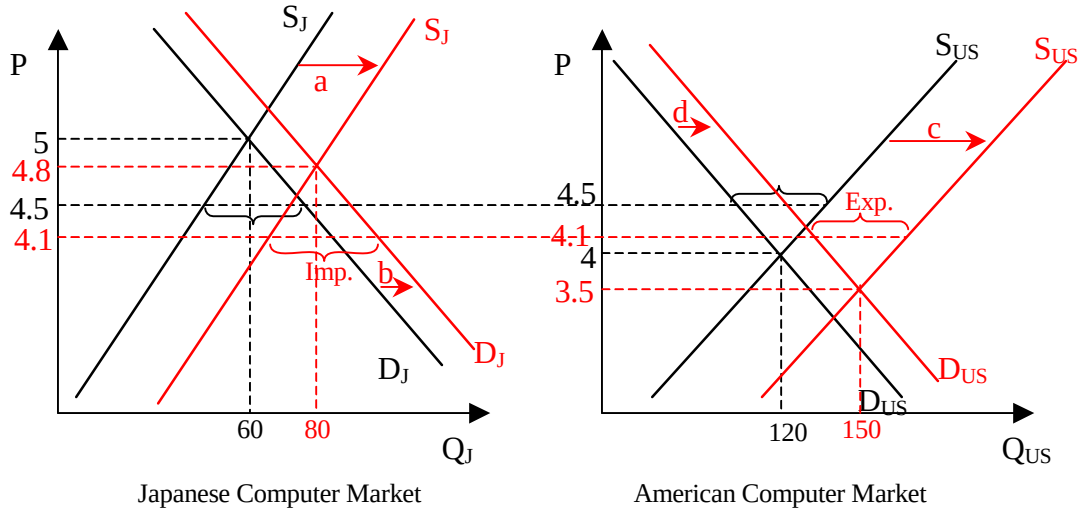


Fig. 1 - Worsening Terms of Trade

There are *four* shifts depicted in the diagram:

(a) the increase in Japanese computer supply
(b) the increase in Japanese computer demand
(c) the increase in American computer demand
(d) the increase in American computer supply

All these four shifts are the results of growth of income & output over time in America and Japan. But they are not all the same size.

The first thing you should notice is that the new domestic prices are different from the old. In the old case, Japanese domestic price was 5 and American domestic price was 4. In the new case, *after* growth happens, Japanese domestic price *falls* to 4.8 and American domestic price *falls* to 3.5. Notice also that the resulting *international* price of computers falls accordingly, from 4.5 to 4.1.

Who benefited and who lost from growth? Obviously *both* are still benefiting. There are gains from trade still being made at the new price of 4.1 after all. But in relative terms, the US position is not as good as before. Remember, the US is selling computers for Japanese stereos. If the international price of computers *falls* that means Americans get *less* stereos per computer they export. In other words, when the price fell from 4.5 to 4.1, the value of American exports fell or, conversely, the cost of their imports rose. In economics jargon, the US's "**terms of trade**" worsened.

Terms of Trade: the price of a nation's exports divided by the price of its imports.

[Note: In our 2 × 2 case where we have only two goods, it happens to be quite simple to calculate terms of trade as prices are *already* expressed in terms of trade. For the US, the terms of trade are the price of exports/price of imports = price of computers in terms of stereos = 4.5. The Japanese terms of trade = price of stereos in terms of computers = 0.22. It's when countries have many exports & imports that calculating "terms of trade" gets more complicated.]

So, our diagram shows that the terms of trade of the US worsened over time because of growth (and, conversely, Japan's terms of trade got better).

Big deal. We could have drawn the diagrams differently and made it such that the international price rose. For instance, look at the diagram below. Here, the shifts in the curves are such that the resulting domestic prices are 5.5 for Japan and 4.4 for the US -- the international price would be somewhere in between, say 4.8, and thus higher than before.

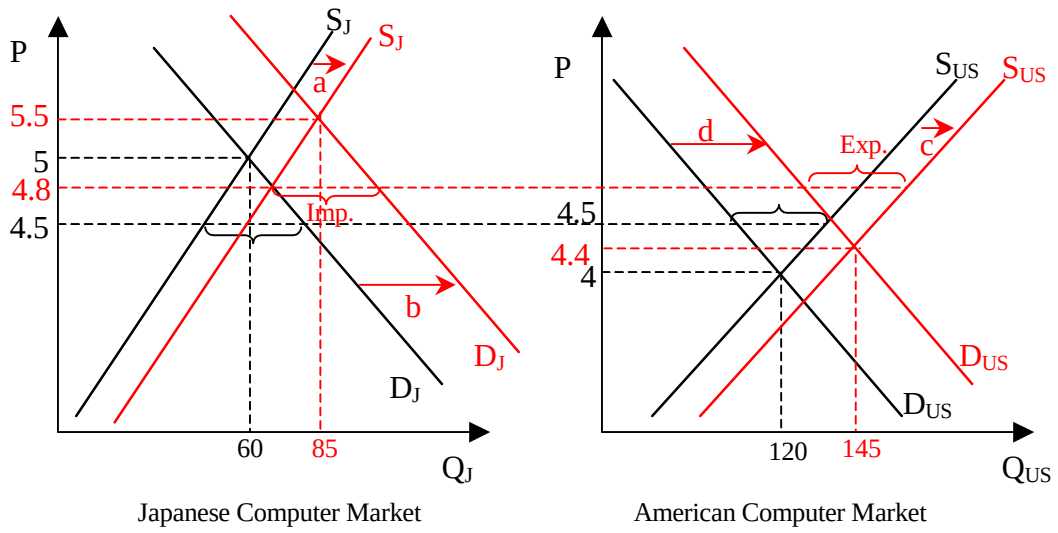


Fig. 2 - Improving Terms of Trade

So, if in the diagram (Fig. 1) the US terms of trade *fell* because of the way I drew it. And in the second diagram (Fig. 2) the US terms of trade *rose* it was also because of the way I drew it.

So what lesson am I trying to convey here?

The basic lesson is that it is impossible to predict today what prices will be like tomorrow as a result of growth. The day trade opened, the US specialized in computers and gave up its stereo industry. That seemed good at first. But the next day, the terms of trade may fall -- and the US gains won't look that hot anymore. On the other hand it is *also* possible the terms of trade may rise – and the US sees even more gains. So growth *changes* the terms of trade tomorrow, sometimes for you, sometimes against you.

Is it really impossible to predict which way it will go? Well, *the way* I drew the diagrams was not arbitrary. In Figure 1, I took great care to make sure that the increases in supply were *greater* than the increases in demand. Look at the diagram again. Notice that the rightward shifts in supply (a and c) are much greater than the rightward shifts in demand (b and d). So, world supply grew more than world demand -- *thus* the international price fell, i.e. the terms of trade for the exporter of computers worsened).

In Figure 2, I took great care to make sure that the increases in demand (a and c) were *greater* than the increases in supply (c and d). So, world demand grew more than world supply -- *thus* the international price rose (i.e. the terms of trade for the exporter of computers improved).

In sum:
- a country's terms of trade will fall over time if world demand for the good it specializes in rises very little and supply of it rises a lot.
- a country's terms of trade will rise over time if world demand grows a lot and world supply grows a little.

If you choose a specialization which you hope will get even better in the future, choose to specialize in goods where you think demand will grow a lot and supply a little and *avoid* specializing in goods where you think demand will grow a little and supply a lot. It's common sense.

What sort of goods am I talking about?

Engel's Law

Economists like to divide goods into two types: **luxury goods** and **necessary goods**.

In common parlance, a luxury good is a good that is not absolutely essential for living, while a necessary one is one that is absolutely essential. But economists use those terms in a more precise way:

- **luxury good** is a good people buy proportionally more of the richer they get
- **necessary good** is a good people buy proportionally less of the richer they get.

Consider basic necessities such as, well, food. The richer you get, the more food you buy. Granted. But as a *percentage* of your income, the amount you spend on food gets less and less. A poor person may easily spend 50% of their income on goods like corn, potatoes or rice. A rich person probably spends less than 5% on those same goods. Thus, corn, potatoes and rice are *necessary* goods.

Conversely, poor people probably spend probably somewhere around 0% of their income on stereo equipment; rich people spend a much larger percentage (e.g. say, 15%). Thus, stereo equipment is a luxury good.

What applies across poor and rich people also applies to countries *over time*. In other words, over time, as countries get richer and richer from growth, their citizens spend a smaller and smaller proportion of their incomes on necessary goods and a greater and greater proportion of their income on luxury goods. This is known as **Engel's Law**.

So here's the implication: over time, as economies grow and people get richer, the demand for necessities will rise, but it probably doesn't rise *as much* as the demand for luxuries will rise.

So, if you're producing necessities, world demand for your goods will *not* grow very much over time. If you're producing luxuries, demand for your goods will grow quite a lot. In other words, combining Engel's Law & our diagrams above, *if you're producing necessary goods, your terms of trade will probably worsen over time* because the demand curve won't be shifting rightwards very much. Conversely, if you're producing luxury goods, your terms of trade will probably improve over time because the demand curve will be shifting rightwards a lot.

So, in the long-run, producers of necessities will do worse than producers of luxuries.

It is an empirical fact that primary commodities are usually necessary goods and manufactures are usually luxury goods. Think about cotton and stereos, and you'll see what I'm saying.

Export-Oriented Investment

Terms of trade fall when demand rises very little and supply rises a lot. We've already mentioned growth of demand. So let's talk about the growth of supply.

When trade opens, nations specialize -- but not completely. In our canonical example, Japan converted some of its computer factories into stereo factories. But it didn't close all its computer factories altogether. There is a sort of equilibrium that is reached where the extent of specialization comes to a stop -- at least, in theory.

OK for today. But what about tomorrow? Tomorrow, new factories will be built in Japan. The magical question is whether these *new* factories will be stereo factories or computer factories. In other words, will investment go into *expanding* the export sector (stereos) or *expanding* the import-substitution sector (computers)?

Without more information, we can't be sure. But there's bound to be a "hangover" from yesterday's specialization. If yesterday businesses went into a frenzy of converting computer factories into stereo factories, certainly some firms also made *plans* to build new stereo factories and very few made plans to build new computer ones. These new factories will go into operation today. There is bound to be more stereo factories opening than computer factories. So, in Japan, the output of stereos is bound to expand more than computers.

[Keep in mind that we're not talking about the day when trade opens, we're talking about the *day after*. Even if the country reached "equilibrium" in international trade at the end of the first day, not everybody knows that. Businesses often make future market projections on the basis of current market situations. On the day trade opened, making stereos was more profitable and businesses probably undertook investment in *that* direction -- even if the market for stereos is already saturated by the time the new factories kick into operation. That's why I call it a "hangover" since plans were made yesterday based largely on yesterday's market conditions]

This hangover story is not a tightly proven fact. It is just something that's observed a lot. Left to their own devices, business investment pours disproportionately into the export sector.

But it is the consequence of this investment hangover which is important: because *tomorrow*, when the factories open, there will be an enormous amount of new stereos produced -- a lot more than market conditions warranted. So, over time, you are bound to see the supply of the good into which you specialized *increasing* by a lot and the supply of the good into which you specialized away from not increasing that much.

The lesson? The hangover may be such that your supply of export goods increases so much that your very own terms of trade *worsen* significantly.

Immiserizing Growth

At the extreme, export-oriented growth may not only make the gains not so great, it may actually *cause* misery. Indeed, it may drive the terms of trade down to the point that people may actually be worse off than if they never opened trade at all. This phenomenon is called "**immiserizing growth**." It can be a result are *far too much* export-orientation.

The following diagram may illustrate the point. Suppose the hangover from investment is such that the shift in American computer supply is *really* large so that something like the following happens:

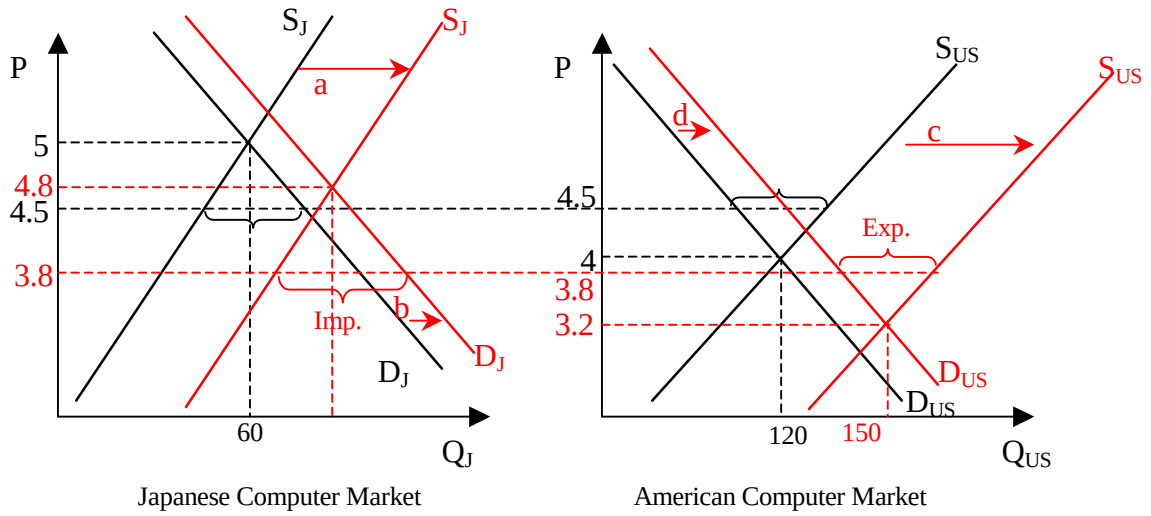


Fig. 3 - Immiserizing Growth

Notice here that the Japanese domestic price falls to 4.8 (like before), but the export-oriented investment hangover in the US boosts American computer supply so much today that the American domestic price is driven down to the *much* lower level of 3.2. Trade remains open -- and the international price in the diagram settles at 3.8! That is *below* 4, the original (yesterday's) domestic price of the US! The US has lost all its gains from trade and is now making a loss (compared to yesterday's "no trade" position).

Now, if Japan had -- yesterday -- proposed an exchange ratio of 3.8 stereos per computer, the US would have refused. Such a price would be "below" the seller's price, so the US wouldn't have specialized and traded and, instead, produced its own stereos itself. But once trade opened and *after* growth has happened, the US is not in a position to refuse (as 3.8 is above the new domestic price). But Americans are worse off than before. Stereos cost more now than they did before there was any trade at all!

The US might do well to grumble and wonder if the original idea of specializing in computers was the good thing to do after all. Seemed like a good idea yesterday. But if it hadn't specialized, perhaps the supply curve wouldn't have risen so much today (here's where the investment "hangover" story comes in). Perhaps things might have ended up differently now.

Has "immiserizing growth" been observed much? Some people say it has. The canonical example is Brazil and coffee. When Brazil specialized in coffee, the result was not merely that Brazilian sugar producers started making coffee; it actually meant that Brazilian firms, large planters, small planters, all sorts, by the hundreds, went out to the jungle and cut down huge swathes of forest to make way for *new* coffee plantations. The result? Well, when the plantations were set up, there was an *enormous* increase in the supply of coffee. So enormous that the terms of trade collapsed *below* the previous Brazilian domestic price.

In sum: Growth means that demand and supply curves shift. Shifting curves means prices fluctuate in an uncertain direction and *who* takes more of the gains from trade in the future also fluctuates and is also uncertain. Indeed, it is possible that the curves shift around in a manner that the original choices in specialization were not so great after all. But many nations, *once* they specialize in something, find it very hard to "unspecialize" and go completely in a different direction.

Trade means specialization, specialization means that nations divert all their industries into particular sectors. Specialization is like putting your economy on a set of railway tracks; once you're on them, it is difficult to drive off in a different direction. And all that specialization was for the sake of the one-time "gains from trade". That gain is there today. Tomorrow, things may change and you may regret your choice -- but you're still on the same tracks. And you may have no choice but to "live with it".

THE TRAGEDY OF COMMODITIES

As we saw above, little growth in demand and excessive growth in supply leads to worsening terms of trade -- perhaps to the point where the country is actually made *worse off* than if it hadn't opened trade to begin with.

I suggested that this was the case exporters of **primary commodities** have faced over the past century or so. It is worthwhile just noting down the causes of insufficient demand growth and excessive supply growth that led to this:

(1) **Engel's Law**: it is an empirical fact that the proportion of income spent on commodities *declines* as the size of income increases. This means that demand does not have a tendency to increase as fast as income. So, while the whole world got richer, they spent a smaller and smaller percentage of that income on purchasing the products of many developing nations. That helps explains why the rise in demand for commodities was so anemic.

(2) **Synthetics**: the creation of plastics, polyester, nylon, synthetic rubber, fiber-optic cables, corn syrup, etc. in the industrialized world has prompted a decline in the demand for primary commodities like wood, cotton, rubber, copper and sugar, produced in developing countries.

[OK, corn syrup is not quite a "synthetic", but the US doesn't import corn (or maize, for you English). Corn production is one of the most *heavily* subsidized industries in the US. So inventing corn syrup to substitute for sugar was an enormous blow for developing nations. Europe did the same thing with beet-sugar.]

(3) **Agricultural Technology**. Improvements in planting & harvesting machinery, artificial fertilizers & genetically-modified seeds has greatly improved the yields not only of first world producers but also in developing countries (the "Green Revolution", etc.). Agricultural supplies have been increased enormously as a result ('oversupply').

(4) **Fall of the Soviet Bloc**: this is an still an unclear phenomena. But keep in mind that Russia and other former Soviet countries are *enormous* commodity-producers. In the Soviet era, they were not very integrated in the world markets, Soviet production was much smaller than its capacity and its commodity industries slowed to a crawl in the complicated embrace of the state-run economic system. But from 1991, Russian commodities have begun flowing more steadily and in greater amounts onto the world market, boosting supply enormously and driving down prices.

THE LEGACY OF COLONIALISM

During the colonial era, imperial powers, like Britain, France, Spain, etc. tried to organize production in their colonies and specialized them to a very great degree, e.g. the British Empire assigned Ghana to produce cocoa, Kenya coffee, the West Indies sugar, Grenada spices, Malaysia rubber, India cotton, Zambia copper, etc.

This was organized more-or-less according to comparative advantage lines -- but not *global* comparative advantage, but *imperial* comparative advantage. The empires themselves were a kind of "customs union" or "trading bloc" and so had all the unfortunate effects of trade-diversion within them. Jamaican sugar (an English colony) was perhaps not as cheap to produce as Cuban sugar (a Spanish colony), but Jamaica had a guaranteed market throughout the British Empire -- which kept high tariffs on sugar produced elsewhere. So they specialized in sugar.

Decolonization brought about another problem. The end of empire also meant the end of the preferential treatment they received within the trading bloc. So these overly specialized-nations were now facing the world markets on their own. Jamaica, which had no industry but sugar, now had to compete head-on with cheaper Cuban sugar for the *same* global markets.

Feeble attempts to "reconstruct" the imperial trading bloc were made immediately after decolonization, e.g. with the organization of the British "Commonwealth", the *Francophonie* community, etc. But Britain, France and other colonial powers soon went into a trading block of their own -- the European Union -- shutting out their ex-colonial suppliers. Jamaican sugar, hit by EU tariffs, now had to compete in their traditional British market not only with cheaper Cuban sugar but also with tariff-free German beet-sugar.

So many developing countries were hit by three successive strokes of bad luck -- (1) they were too specialized; (2) that specialization had been geared to a trading bloc that no longer exists; (3) their traditional European markets have shut themselves off from them.

Of course, the recommendation was "change your specialization" according to the new global comparative advantage, but that is easier said than done. For these nations were not only over-specialized, they were also quite poor. Many simply did not have the resources to finance such an extreme make-over.

So the only avenue seemed to be to persist and try harder. Instead of switching away from sugar into something else, many West Indian nations tried to make their sugar cheaper and more attractive. That often meant using whatever few resources they had to invest *more* in the sugar sector hoping that they could gain "economies of scale" and sell their sugar for cheaper.

[While colonialism fostered dependency, dependency does *not* need colonialism to take root. See Appendix III for some historical examples of underdevelopment-through-trade between non-colonial partners.]

ECONOMIES OF SCALE

In an earlier section, I insisted that the "law of increasing costs" was in operation -- the more firms try to produce, the more expensive it gets to produce.

But, in fact, this is not always the case. It applies in the short-run. But in the long-run, many industries, especially manufacturing, exhibit what are called "**economies of scale**" or long-run "law of decreasing costs": the more you produce, the *cheaper* it gets.

Underlying the notion of economies of scale is the idea that production can benefit from the **division of labor**. This idea stems from Adam Smith (1776).

Intuitively, "division of labor" means that a job carried out by one worker becomes more efficient if that job was broken down into specific tasks carried out by different workers. This is the logic behind assembly-line manufacturing.

Suppose one worker takes a week to build a car by himself. So, a hundred workers, each one producing a car by himself, would produce only one hundred cars a week.

But if we reorganized the tasks so that instead of each worker building a separate car, the hundred workers cooperated, each one doing a little bit over and over again as the cars move along the assembly line -- one fits the wheel on the axle, another connects the radiator, etc. -- then the hundred workers might, together, produce *five hundred* cars a week.

If you are the entrepreneur and implement this "division of labor", you still only have to pay them for one week's work. But you now you get five hundred cars, rather than one hundred. So the labor costs *per car* are much cheaper.

So why doesn't everybody do this? Because many industries don't find it profitable to do so because they are *too small*. If, sticking to our example, I can only *sell* ten cars a week, there is no point in hiring a hundred workers to produce five hundred cars. I'd been spending a ton on wages, and have 490 cars unsold. It is better to just hire ten workers and have them produce ten cars, each by himself.

But why not put the ten workers in the assembly line? Because it may not be technically feasible. For the assembly line to work properly, the line needs *at least* a hundred workers. There are one hundred tasks along the line. Ten workers on that line would be running up and down continuously and exhausting themselves, getting into each other's way, etc. Everything becomes much too complicated. When you have only ten workers, it may be more efficient, in that case, to let the ten workers work by themselves.

So, the main point of "division of labor" is that you can (or should) only implement it if you *want* to produce a lot of goods. If you do not think you are going to sell five hundred cars a week, it is probably not worthwhile to build an assembly-line factory.

This is why "division of labor" is called an "economy of scale". The greater the size of your output sales, the more scope you have to divide labor into multiple tasks and become more efficient. As Adam Smith said, "the degree of division of labor is limited by the extent of the market."

Which brings up a rather important point related to international trade. Trade *expands* the size of markets. If a country specializes in a manufactured good, e.g. automobiles, then when a foreign market opens up to them, it might become suddenly worthwhile to reorganize your plant into an assembly-line format, undertake division of labor and gain economies of scale.

For instance, take my little car example. I only produced ten cars a week because that's all I could sell. But if trade opens and now I can supply the entire Brazilian market, my sales will shoot up -- perhaps to the point where I *can* sell five hundred cars a week. The first thing I'll do, of course, is build the assembly line manufacturing plant which was not profitable before. Now I'll have *even cheaper* costs per car and thus greater profits.

But some industries are *more prone* to economies of scale than others. Manufacturing industries, in particular, are very easy to organize into assembly-line format. Agriculture, of course, has less scope for that.

This is where developing countries missed out. For the most part, they specialized into producing ***primary commodities*** (i.e. the output of agricultural and extractive raw materials like rice, cocoa, coffee, cotton, rubber, copper, etc.) where there is little, if any, scope for division of labor. Growing coffee on a few acres with a few workers uses more-or-less the same methods of cultivation and harvesting as growing it on hundreds of acres with hundreds of workers. There aren't many economies of scale there.

In contrast, industrialized countries are, well, industrialized, i.e. they specialized in ***secondary commodities*** (i.e. output of manufacturing industries) which have *great* economies of scale because of the dramatic efficiencies brought about by greater division of labor and "assembly-line" techniques which can be implemented.

So when trade "opened up" between industrialized and developing countries, the former gained a lot from the sudden expansion of the market. They built assembly plants and their costs got much cheaper. Developing countries also expanded their production of primary commodities to meet greater world demand for their goods, but their techniques didn't change much and so their costs per unit did not decline that much at all.

In sum:

The "dependency thesis" suggests that specialization and trade may seem like a good thing, but when you consider its long-term implications in conjunction with growth, trade doesn't look all that great anymore. In particular, you have to pick your specialization *carefully* so that you reap the greatest benefits in the long run. And if you have to institute protection in order to help import-substitution industries grow until your economy is a bit more balanced, perhaps it is best to do so. A little temporary pain for a long term gain.

Many countries did just that in 1960s & 1970s. The results are not all that great. Protected industries have very little incentive to improve and so very few countries successfully nurtured them to the point where they were able to compete on the international market-place.

Were the dependency theorists wrong? Perhaps. Or perhaps the dependency theorists were right in their analysis, but wrong in their policy conclusions. Even if we were to admit that that growth *and* trade can have bad consequences for poor countries, "cutting off trade" is *not* the only policy conclusion. The alternative is to keep trade open, but make sure growth goes in the *right* direction. That means the government should have a much *more* "hands-on" approach to the economy than simply setting up tariffs and quotas. It means jumping in and actively making sure investment is going where you want it to go. This is sometimes known as ***dirigisme***.

LATE INDUSTRIALIZATION

Dirigisme

Dirigisme ('directionism') is different from protectionism. With protectionism, the government just erects tariffs and quotas and then steps back and lets the rest work out as it will. With dirigisme, the government doesn't step back. Government stays heavily involved in the economy, and decisive in directing of course of economic development.

In particular, a dirigiste government makes sure investment is going in the right direction. The "purest" kind of dirigiste regime is a socialist or communist one. Here, making sure capital-formation happens is easy: you just order capital to be produced.

But in less-than-socialist countries, governments with dirigiste desires can still direct industry by allocating loans and funds to particular industries and starving others of them. It cracks the whip, making sure that the funds are applied where it wants them. It can get heavy-handed too, making sure both laborers and capitalists are cooperating with the government's industrial plan, that the profits are reinvested where the government thinks they should go, and not gobbled up by wage or dividend demands.

As an economic strategy, dirigisme should make us skeptical: after all, governments aren't always right and they make some rather grievous mistakes. Besides, we know how government interference can produce price distortions and inefficiencies and leave consumers wanting.

True. But that's the point. "Getting prices right" is what we want in order to allocate resources properly to satisfy as much consumer demand as possible. But dirigisme is not about satisfying consumer demands, nor worker demands. It is about *growth*, i.e. pumping up capital formation as quickly as possible. The point is not to "get prices right", but rather to "get prices wrong" so that more resources are pumped into building capital than would otherwise be the case.

Now, this may sound scary. The idea of heavy, authoritarian government direction overriding the desires of consumers and workers may seem ominous from the point of view of basic human freedom. Well, yes. But *dirigisme* is not about human freedom. Dirigiste regimes tend to be police states -- and quite ugly to look at.

But does it work? Have dirigiste regimes created "growth"?

The empirical evidence seems to indicate that it does -- although the human cost may not necessarily be worth it.

The 19th Century is illustrative here. Early in that century, countries like Britain, Belgium and the Netherlands industrialized quickly. They didn't have protectionism or dirigisme,

and fared quite well. But they also didn't have to compete with a rich world undercutting their markets since there was no rich world out there to compete with.

Later in the century, other countries had tried to industrialize too but were (naturally) undercut by the early industrializers like Britain. Through most of the 19th C., the British lead in industrial manufacturing was domineering. In 1840, British manufacturing industrial output (per capita) was some 60-70% greater than Belgium's, 250% greater than Germany and 350-400% greater than France. The British textile industry consumed over 50% of world's cotton crop. The British iron industry produced one-third more iron than the rest of Europe put together. Even in 1900, more than 50% of the British workforce was concentrated in large industrial towns, while Germany and France it was a mere 20% and in Spain, Italy and Austria-Hungary barely 15%.

How to catch up? Many late-industrializing nations, notably the United States, went the way of protectionism to shut out British manufactured imports and allow their industries time to take root. But other countries took more forceful steps.

Most notable here is the Germany. Under the formidable chancellor Otto von Bismarck, the German government opted for a more dirigiste approach. Instead of closing markets and hoping for the best, the government stepped in heavily. It set up a "corporatist" state where capital & labor were carefully coordinated by government, it allocated industrial subsidies, kept demand high by instituting a welfare state, etc. With the government obsessively concentrated on the growth of "coal-and-steel", Germany industrialized. Not happily. Bismarckian Germany was hardly a land of liberty. The German "industrialization" success story prompted other aspiring European countries -- like France -- to gradually abandon simple protectionism, and embrace dirigisme.

In the 20th Century, dirigisme went further. At the extreme were communist regimes, like Soviet Russia, that set up industrialization programs by command and at great human cost. But they seemed to have worked, transforming what was hitherto a heavily agricultural nation into one with a reasonably large industrial sector. (the Chinese equivalent -- the "Great Leap Forward" -- attempted to replicate this, albeit less successfully)

The most famous cases of "light-touch" dirigisme was Japan, followed by the East Asian tigers (Taiwan, Thailand, South Korea and Singapore). What was their "trick"? Economists are still debating this one. There wasn't too much overt "protection" from foreign competition (indeed, Japan was forbidden to have protectionist tariffs). If Japan couldn't institute protection to provide a domestic market for its domestic producers, it went one better: it looked abroad to foreign demand for its domestic producers.

Japan (and the East Asian tigers) followed a strategy of export-led manufacturing growth. The trick was how to make Japanese manufactures cheap enough to foreigners to buy. They turned to a *lot* of government help. Government gave these industries subsidies and directed cheap funds in their direction, allowing them to keep prices low and attractive for foreign buyers. Foreign investment was encouraged, bringing foreign capital and expertise to boost their domestic industries, a provide a modicum of disciplinary competition. Gradually,

Japan and the East Asian tigers acquired manufacturing industries which were cheap and efficient enough to compete on the international market-place without outright government assistance.

The lesson that East Asia seemed to teach was that perhaps the dependency theorists were right in their analysis, but wrong in their policy conclusions. Trade complicates growth. But trade also helps growth, when combined with a vigorous government industrial policy.

China in 2000s

One of the most notable industrialization stories of late is China. From an overwhelmingly overpopulated and poor agricultural peasant country, China has turned the page to become a growing industrial power.

Its first attempt, through direct communist industrialization programs in 1950s and 1960s (e.g. Great Leap Forward), did not seem to yield fruit. But since the 1980s, and particularly 2000s, it has rapidly grown apace in a context which seems open to trade.

How did they do it? The old fashioned way: dirigisme & protectionism.

Dirigisme is easy to see: the Chinese government has followed the pattern of other East Asian industrializers: picking 'favorites', encouraging and funneling cheap capital and subsidies in the "right direction", encouraging foreign investment and expertise to boost Chinese industries, and so on.

It is China's protectionism that has been more controversial. At first glance, China's protectionist regime isn't quite obvious – its tariffs are not really higher than those of other countries. The trick has been to manipulate the exchange rate. The Chinese government has been deliberately keeping the yuan undervalued on currency markets throughout most of the past decade and a half. Properly valued, a $1 USD should be about 3.5 Yuan. But the government has been manipulating the exchange rate to push the rate down to $1 = 6 Yuan.

An undervalued currency has a double effect: it makes foreign goods more expensive than they really are to Chinese consumers (ergo replicating the effect of a tariff) and makes Chinese goods cheaper than they really are to foreign consumers (ergo replicating the effect of an export subsidy). Thus it replicates the effect of a protectionist regime, without being explicit about it.

This strategy, using exchange rates to penetrate foreign markets and protect your own, is sometimes called "**beggar-thy-neighbor**" exchange rate policy.

Exchange rate policy is difficult to counter. The WTO only has oversight over outright tariffs, quotas and export subsidies. But it has no controlling authority over exchange rates. That domain belongs to the IMF, but the IMF no longer imposes rules about how to set exchange rates.

If the Chinese strategy seems so simple and straightforward, why haven't other countries adopted it? For various reasons. First, dirigisme isn't cheap. It requires dishing out money, and many poor governments simply cannot afford it. But a lot of it is also related to political will, or rather political unwillingness. Governments may not be willing or able to heavily tax the population, or impose heavy handed measures such as forcing wages down, in order to subsidize the operations of a handful of chosen export-led manufacturing firms. Even if they do manage that, they might be unable, again for political reasons, to 'discipline' capital and force it to go in the growth direction. The firms and their owners might just decide to do something else with their cheap funds & subsidies, and have enough political clout to fend off any government inquiry. Finally, many poor countries are also tempted to overvalue rather than undervalue their exchange rates, to keep their imports of foreign consumer goods cheap and keep their urban consumers happy – a short-run gain at the long-run cost of their export industries.

Finally, keep in mind that there are many, many examples or attempts at dirigisme turned out to be ill-thought and ill-managed. There are many cases where government intervention did not only not improve development, it in fact thwarted it. The emergence of huge bureaucracies, state regulations, corrupt or "kleptocratic" government can suffocate private investment and distorted incentives to the point of creating extraordinary inefficiencies. It is very easy for a government-directed industrialization program, even a well-meaning one, to create more problems than it solves.

DEVELOPMENT FIRST

We started off noting that improving standards of living is best done by improving productivity growth and productivity growth depends, in turn, on the following two things:

(a) technological progress (better *f*)
(b) capital formation (increasing K/L)

Since investment in physical capital helps both (a) (indirectly) and (b) (directly), it is no surprise that development economists focused *a lot* on encouraging investment in physical capital. But the results have been mixed. We have thrown up some tentative reasons why this might be the case.

But the first thing you should probably be wondering is whether "development" should really be identified with mere "growth". Growth, after all, means merely "increase". But development implies "change". That's not exactly the same thing. Indeed, they might be contradictory.

Development, after all, is about a lot of things -- about eliminating poverty, disease, unemployment, inequality, environmental degradation and the like, objectives which are desirable in themselves and which sometimes (indeed often) clash with the sheer desire for "growth". Development issues should perhaps be reviewed on their own merits, and not merely as appendages to an underlying growth thesis.

That doesn't mean that development shouldn't keep growth in mind. Indeed, getting development "right" may be the first step in order to permit growth to prosper. But the obsession with increasing physical capital has sometimes exacerbated and even created development problems.

APPENDIX I: A PRIMER ON FINANCIAL MARKETS

(Extracted from *Financial System* notes.)

"Finance" is the channeling of the savings of individuals to be used by firms (& individuals) for investment projects. There are three essential types of financing:

-- via bank deposits
-- via bonds
-- via stocks.

(1) Bank Deposits

This is financing through a "commercial bank" (e.g. Citibank, Chase, NatWest, etc.) and is certainly the most common way of financing investment projects for most small and mid-level companies and individual home-buyers.

The process is straightforward: savings are deposited into a bank by individuals and the bank lends out to borrowers at a pre-determined interest rate and pay-back schedule.

There are various types of deposit, but essentially they can be broken down into two types: **checking deposits** (depositor receives very little or no interest, but the saver can withdraw at any time) and **savings deposits** (also called "time deposits", where the depositor receives some interest, but must give advance notice, sometimes quite lengthy, before withdrawing). "Money market accounts", "CDs", etc. often come in this last category.

Most banking systems operate on the principal of "**fractional reserve banking**", meaning that a portion of every deposit must be held in cash (or near-cash), e.g. if the "fractional reserve ratio" is 10%, then for every $100 received in deposit, $10 must be retained in cash and only $90 can be lent out.

The reason banks hold reserves should be obvious: individuals withdraw from their deposits all the time. The bank must have *some* amount of cash to meet those withdrawals. But it need *not* hold the entire deposit in cash since it is unlikely that everybody will want to withdraw their full deposit all at once. That gives the bank leeway to lend the remainder of the deposit out.

(However, it sometimes *does* happen that everybody tries to withdraw all at once -- what is known as a "**bank run**" or a "**bank panic**". In such cases, the bank will be unable to meet the withdrawal requests and forced to freeze accounts or go bankrupt. These panics happen occasionally and often have devastating effects. Thankfully, they are less frequent nowadays than they used to be -- in large part because deposits at commercial banks are insured by the federal government (via the Federal Deposit Insurance Corporation (FDIC)) since the 1930s.

However, that doesn't mean disasters can't happen. The most famous case was the massive collapse of Savings & Loans corporations (sort of like mini-banks that specialize in mortgage lending) in the early 1990s. They collapsed not because of a bank panic, but because of reckless lending to risky (and often criminally devious) real estate projects that went sour. Their deposits were insured by the FSLIC (a sister of the FDIC). The Federal government had to pay off nearly $100 billion to depositors who had lost their money in the S & Ls.

If, for some reason, the bank has overlent and doesn't have enough reserves to maintain its fractional reserve ratio (e.g. if it "accidentally" lent $95 of the $100 deposited), then it needs to "find" the extra $5 cash somewhere else to back up its position. In such a situation, what a bank does is go to *another* bank which has some extra cash floating around and ask them to lend them the cash temporarily. This is known as the "money market" or "**inter-bank market**" (in the US, it is called the "federal funds market"). Inter-bank cash loans are often very short (a few days) and cost very little interest (1% or 2% *p.a.* or something like that).

The interest rate on the inter-bank market is very deftly manipulated by the Central Bank (i.e. **Federal Reserve** in the US). They inject and take out cash from that market all the time by using its stores of Treasury Bills (short-term government bonds). When you hear reports on the news about how the Fed "lowered interest rates to 1%" what that means is that the Fed has manipulated the inter-bank market so that the interest rate banks charge each other for cash reserves is 1%. Banks often use the inter-bank rate to decide what interest rate to charge on loans.

But there is a second interest rate the Fed is involved with you sometimes might also hear about -- known as the **discount rate**. When borrowing cash from other banks is too expensive, a commercial bank in dire straits can try begging the Federal Reserve for a special cash loan from the Fed's "**discount window**". Although the discount window interest rate is usually cheaper than the inter-bank rate, the Fed frowns on banks who apply for it. The discount window is supposed to be a "loan of **last resort**", not a cheap source of cash banks can call on at any time. The Fed doesn't want to indulge a bank's propensity to overlend. If a particular bank comes several times to the discount window, the Fed will "close the window" to it and force it to cut back its propensity to lend.

(2) <u>Bonds</u>

A bond is a *debt claim* on a private company. Firms *borrow* money from people and give them a piece of paper ("the bond") promising to repay it. The bond has an ***interest rate*** (or *yield*) incorporated into it. A person who buys bonds in Acme Inc. doesn't own a piece of the company, he is simply *owed* money by it. He *will* be paid back the principal on a particular day. The sum it repays is *fixed*. It does not matter whether the firm's profits are high or low.

[of course, there is always the risk that the firm is doing so badly that it will be unable to pay off its bonds and thus be in **default**. In that case, the firm is usually forced to declare

bankruptcy and **liquidate** itself (it is dismantled, its assets (factories, equipment, etc.) are sold off and the bondholders (and other creditors) are paid off from the proceeds of the sale].

Bondholders receives **interest** on the amount lent. How that interest is calculated depends on the type of bond you're talking about.

The most common is the **discount bond** which incorporates the interest in the final payment. Technically, a discount bond is merely a piece of paper saying something like "Acme, Inc. promises to pay $1,000 to the holder of this certificate on January 1, 2005". So the interest on this bond (or what Wall Streeters call the ***yield to maturity***) is incorporated in the difference between the buying price of the bond certificate and the maturity payment. (e.g. if Acme, Inc. sells me this bond for $900, then the yield is an annual interest rate of 11.1%). The formula for calculating the implied interest on a discount bonds is simply:

interest rate = gain divided by purchase price

In our example, 11% = gain ($100) divided by selling price ($900)), so our bondholder is making a one-year $900 loan to the company, for which he will receive 11% interest in return. But if the bondholder pays $950 for it, then the implied interest rate is 5.3% per year (= $50 gain divided by $950 price). So the *higher* the selling price of the bond, the *lower* the interest rate.

For bonds that mature two or more years from now, the formula for calculating the (yearly) interest rate is a little more complicated as you have to take account of compounding. But the general principle (high purchase price = low interest) is the same. Typically, bonds maturing *later* have a higher implied yearly interest rate than bonds maturing *soon.*

A **coupon bond** offers me a bondholders different payment schedule where the company offers to make some yearly fixed payments (known as "coupon payments) *before* the maturity date. e.g. "Acme, Inc. promises to pay $1,000 to the holder of this certificate on January 1, 2010. It also promises to pay the holder $100 on January 1 of every year until 2010."

The coupon payments are taken into account when purchasing this type of bond. A rough-and-ready way to calculate the yield on this type of bond (in finance parlance, the "current yield") is to simply divide the coupon payment by the buying price of the bond. e.g. if this Acme coupon bond sells for $1,100, then the yield is 9.1% annually (not exactly correct, but approximate).

There is a weird class of English bonds (known as **consols**) which *never* mature at all but are composed entirely of yearly coupon payments for all eternity. (If that's an infinite gain, wouldn't you pay an infinite amount for a consol? No. How much do you currently value coupon payments to be made in the year 2250, long after you and possibly all your descendants are dead?).

At any rate, regardless of *when* or *how* it is paid, bonds mature and the principal and interest will be paid in a pre-determined fashion. What you receive is *not* dependent on the profits of the company. The company must pay off its debt and meet its interest payments regardless.

(3) <u>Stocks</u>

A stock (also called a "share") is a claim of *ownership* on a private company. Firms that issue *stocks* are selling pieces of their company to individual savers. So they never have to "pay back" funds raised by that method. It just a sort of glorified "partnership", where you put up funds and share the profits.

A person who owns stocks in Acme, Inc. owns a share of that company. He is entitled to a proportional share of the *profits* of that company. Those profits are distributed to him yearly in the form of ***dividends***. But if the company makes no profits (or decides to retain those profits for itself), the stockholder is paid no dividends. Stockholders are *not* guaranteed any particular amount of dividend income yearly. It varies with the amount of profit and sometimes (quite often, actually) dividends are not paid at all.

So a "stock" is merely a piece of paper saying something like "The bearer of this stock certificate owns a 1/100th share of Acme, Inc.".

Many firms issue *both* stocks and bonds in order to raise funds to finance their operations and many individuals hold *both* stocks and bonds in a firm.

Which is better? Depends. Think of it this way: bondholders are the *first* to be paid, but the payment is fixed. Stockholders are the *last* to be paid, but the payment is flexible.

So, if a firm is doing really well (booming profits), stocks are probably the better thing to own since they will get all those profits as income, while bondholders will only get paid a fixed interest. On the other hand, if there are no profits, bondholders will get paid but stockholders receive nothing. When a firm goes bankrupt and must be liquidated (i.e. its capital is sold off), creditors (bondholders) are the first to be paid off from the proceeds; owners (stockholders) receive whatever is left over (which is often nothing at all).

Stockholders also have certain *rights* as owners of a company -- in particular, they participate in the governance of the company. They elect the board of directors and have a voice at the annual general meeting (votes are proportional to % of total stock owned).

So, in sum:

Bonds

- are a *debt* claim on a firm.(they will be "paid back")
- bondholders receive a fixed repayment on their loan (unrelated to profits).
- bondholders have no role in corporate governance.
- bondholders are the first to be paid off in case of bankruptcy

Stocks

- are an *ownership* claim on the firm (they won't be "paid back")
- entitles the stockholder to a proportional share of profits (paid out as *dividends*)
- entitles the stockholder to a proportional share in corporate governance (voting weight at AGM)
- shareholders are the last to be paid off in case of bankruptcy.

(See our section on *Financial System* for more details).

APPENDIX II –The Multiplier Story
-- How Investment Generates Savings --

(*extracted from* Business Cycle *notes*)

We said, in the main notes, that, by Keynes's Law, investment generates its own savings. Here we shall see how it works.

When firms undertake investment projects, they borrow on credit from the financial sector to hire people to build new capital goods. Those people are paid with the borrowed money.

So, if a firm borrows $100 to spend on investment projects, they will generate $100 income for workers and others employed in the capital goods-producing industry.

But the workers won't stand around letting the $100 burn a hole in their pocket. They will spend it -- or at least a portion of it – on stuff they want, like chewing gum and lollipops. Say, they spend 80% of their income and save 20%. Then the $100 in income they receive from employment in the capital goods-producing industry will translate into $80 worth of extra consumption (chewing gum & lollipops, etc.) and $20 worth of extra saving (deposited in bank).

So, $100 investment has generated $10 worth of saving. They are not equal. Yet.

They are not equal because we are not done. The $80 spent on chewing-gum & lollipops by capital-goods workers will *in turn* translate into $80 worth of extra income for employees of the chewing gum & lollipop industries. *They* too will spend 80% of that $80 (i.e. $64) on consumption of other stuff (say, bread & butter) and save 20% (i.e. $16). So total income in the economy has increased by an extra $64 and savings have increased by another $16.

But the $64 consumed by chewing-gum-and-lollipop workers will itself translate into income of workers in the bread & butter industries. They in turn will spend 80% of that (= $51.20) on something, and save the remainder (= $12.80).

And the $51.20 of extra consumption spending by bread-and-butter workers becomes somebody else's income. So 80% of $51.20 (= $40.96) is spent, and the rest ($10.24) saved.

And so on by that pattern.

Notice what happened. We had a boost in investment spending by $100 which has generated a whole endless cascade of further increases in income and spending. The consumption of workers generates a feedback loop so that an injection of $100 spending generates *more* than $100-worth of income in the economy as a whole. But notice that in each round, the amount of extra induced spending becomes less and less. So, the feedback loop will eventually wind down.

So, after it works itself through, what is the *total* increase in GDP (GDP = total output = total income) Well it's the $100 injection plus all the induced rounds of consumption, summed together:

Total increase in GDP = $100 + $80 + $64 + $51.20 + ...

and so on *ad infinitum*. What is this amount? We are summing an infinite series of numbers, so is the total sum infinite as well? No. Takes a little knowledge of math to figure it out. Remember that 80% of every addition to income is spent. So notice this sum can be rewritten as:

Total increase in GDP = $100 + (0.8) ($100) +

(0.8)((0.8)($100)) + (0.8)(0.8)((0.8)($100))) + . . .

Substituting c = 0.8, then we can rewrite this as:

Total increase in GDP = $100 + c($100) + c^2($100) + c^3($51.20) + ...

where c = 0.8. This c is known as the **marginal propensity to consume**, which is defined as the proportion of every dollar of income that is spent on consumption.

Now, notice the sum can be rewritten as:

Total increase in GDP = $(1 + c + c^2 + c^3 + \ldots) \times \$100$

A mathematician should recognize this immediately. As c is a fraction, then the infinite sum $(1 + c + c^2 + c^3 + \ldots)$ is actually a finite number. And there is a simple formula for it:

$(1 + c + c^2 + c^3 + \ldots) = 1/(1-c)$

(check a math textbook if you don't believe me). So, in conclusion:

Total increase in GDP = $[1/(1-c)] \times \$100$

Or, for our example, as we know c = 0.8, then:

Total increase in GDP = $[1/(1-0.8)] \times \$100 = [1/0.2] \times \$100 = 5 \times \$100 = \$500$

So there we have it. The *total* increase in GDP from a $100 injection going through all those rounds of income-induced consumption feedback is actually easy to determine: it is $500.

In sum, an extra injection of $100 of investment spending does not merely increase GDP by $100. It increases GDP by $500. Five times as much impact. That is a lot of bang per buck.

[Note: Our initial injection came from more investment spending. But it could have come from more government spending. Or from lower taxes. Or from more net exports. Or from a wave of consumer confidence boosting consumption autonomously. *Anything* that increases aggregate demand -- any injection of spending -- will have a much greater impact on the economy than the amount actually injected. The general formula is:

Total increase in GDP = [1/(1-c)] × injection of spending

The factor 1/(1-c) has a special name. It is known as **the multiplier**. **]**

But there is a downside too. Just as any *increase* in spending has a magnified effect, so too does every *decrease* in spending have a magnified effect -- in the opposite direction. A $100 *reduction* in investment spending will *reduce* total aggregate demand (and real GDP) by $500.

The Keynesian Revolution

The multiplier was originally discovered by **John Maynard Keynes** back in 1936. It precipitated a veritable revolution in economics against the old Neoclassical/Neoliberal orthodoxy.

In the 1930s, all the western economies mired in the Great Depression, orthodox economists were at a loss: there were plenty of resources -- factories, workers, raw materials -- available, wages were low, why weren't people being hired & producing stuff? The only answer they came up with is that wages simply must not be low enough -- and so called for reductions in wages.

Keynes diagnosed the problem differently -- and used the multiplier to tell the story. People weren't being hired because firms weren't selling their output. And they aren't selling their output because people aren't buying stuff. But people aren't buying stuff because . . . their incomes are too low! Instead of *lowering* wages further, as the orthodox economists recommended, Keynes recommended everything must be done to *increase* people's incomes. Higher incomes, means more consumption, more consumption means more demand, more demand will lead to more sales. And once the sales pick up, that's when firms start hiring again to produce more output -- which means workers get *more* income to buy *more* stuff, etc. It's that income-consumption feedback loop thing again.

The question is how to get the ball rolling, i.e. the initial injection. There were plenty of levers available to the government: it could lower interest rates (via the Central Bank) to try to spur private investment spending; or it could reduce exchange rates to boost net exports; or it could lower taxes (giving people an income boost); or, as happened in so many

countries, it could just increase government spending (e.g. building roads, dams, airports, military, etc.)

In the 1930s, governments weren't waiting for Keynes to say what he said. They were doing it already. Franklin Delano Roosevelt's New Deal program was designed precisely along those lines. His numerous public works projects (building roads, dams, etc.) were an injection of government spending. Abandoning the Gold Standard (i.e. lowering the exchange rate) boosted net exports. Federal programs guaranteeing deposits, mortgages, etc. boosted consumer and firm confidence that, in turn, increased spending. His Social Security programs boosted the incomes of the retired & unemployed, getting them to spend more on consumption. The Federal Reserve lowered interest rates to rock bottom to boost investment spending.

All this was already underway before Keynes's *General Theory* was published in 1936. As one senator put it, after reading the book, "We already knew it was good policy. Now we know it is also good economics."

Did it work? Yes. There were a few mistakes -- notably, afraid of budget deficits, Roosevelt foolishly raised taxes as well (causing a brief recession). But, on the whole, it worked, particularly when the last (and biggest) boost of government spending finally kicked in -- the military spending for World War II.

The Keynesian logic has been followed by most governments since World War II -- and continues to be followed today. As a result, the business cycle was tamed a bit -- more on which we have to say later.

The Paradoxes of Thrift

The multiplier story shows up two other fallacies which orthodox economists used to fall into. Saving -- or "thriftiness" -- used to be regarded as a "good" thing for the economy. If people saved more, the economy would grow more, they thought. The multiplier story shows this to be a fallacy.

Paradox #1 - *If you save more, you're making it harder for the economy to grow.*

Consider two countries, say, US and Japan. Say the spendthrift US consumer saves a pittance, only 10% of his income (thus c = 0.9), while the thrifty Japanese consumer saves a larger proportion, say 40%, of his income (thus c = 0.6).

Say both economies are in recession and both the US and Japanese governments attempt to increase real GDP by increasing government spending by $100. What is the effect?

In the US, the $100 injection will increase real GDP by a factor of $(1/(1-c)) \times \$100 = \$100/0.1 = 10$, so $10 \times \$100 = \$1{,}000$.

In Japan, the $100 injection will increase real GDP by $(1/(1-c) \times \$100 = \$100/0.4 = \$250$.

So, although both the US & Japanese governments spend the same amount ($100), the US gets a *lot* more bang-per-buck than Japan, $1,000 vs. $250, a *huge* difference.

So Japan would actually be a lot better off if its consumers were *less* thrifty.

In fact, this example is not too far from the truth. Japan has been stuck in a depression throughout most of the 1990s -- even though the Japanese government has tried everything in the Keynesian rule-book, from spending massive amounts of government programs, lowering taxes, driving interest rates to zero (even negative), but the economy has failed to budge. The culprit? Nobody is quite sure. But the fact that Japanese consumers have a rather low marginal propensity to consume has been a critical factor in making the Japanese government's policies have so little impact.

Paradox #2 - *If you try to save more, you won't end up with more savings.*

This is really a paradox -- and takes some thinking to work through it. Consider the US-Japan case again in the previous example. Japanese were thriftier. Are their *total* savings greater? No.

To see this, reason through the following: US consumers are saving 10% of their income. From an injection of $100, their total income increased by $1,000. 10% of 1,000 is precisely $100. So *total* US savings increased by $100.

Now look at Japan. Japanese consumers were saving 40%. From the injection of $100, total income increased by $250. 40% of $250 is . . . $100. So *total* Japanese savings increased only by $100 as well!

So, even though Japanese consumers *tried* to save more than Americans, they *didn't* end up with any more savings. On the whole, they saved *exactly* the same amount as the Americans!

Counter-intuitive, but true. We like to think that if *we* personally save more, we end up with more savings. But when we take into account how our thrifty behavior impacts other people and businesses in the economy, that is not quite the case. As Keynes liked to say, "Whenever you save a shilling, you put a man out of work for a day". And by putting *him* out of work, then *his* income is lower and *both* his consumption and his savings fall.

That's why we must be careful when looking at the economy as a whole. We must avoid reasoning by analogy to a single individual's situation.

(*For more details on all this, see the* Business Cycle *section*)

APPENDIX III: Dependency Theory in History

While it is common to discuss that 'dependency' theory and 'colonialism' in the same breath, the two are not necessarily related. Stagnant growth and deteriorating terms of trade, as predicted by dependency theory, will emerge whenever one country (or region) specializes in the production of manufactured goods while another country (or region) specializes in the production of raw products. There need be no current or past colonial political linkage between them. Nor is it a peculiarly modern or recent phenomenon that only afflicts countries in the developing world in the past half-century.

The following are a few historical examples of underdevelopment-through-trade relationships, *without* actual colonialism being in place. You can replicate the dependency relationship and all its ill-effects without outright political subjugation or connection between the countries.

(1) Portugal & England, 18th C.

In 1703, Portugal and England signed the Methuen Treaty, one of the first trade agreements in history. By the agreement, Portugal would open its domestic markets to imported English cloth, and England open its markets to imported Portuguese wine.

Cloth was a manufactured good and a luxury. Wine was an agricultural product and a necessity.

The pattern of growth and terms of trade followed accordingly. . As Portugal 'de-industrialized' (shut down its cloth industries), Portuguese productivity and standards of living began to decline and stagnate for the next few decades. The terms of trade steadily turned against the producer of the necessity (Portugal) and in favor of the producer of the luxury (England). Portuguese pamphleteers and agitators suggested English merchants were unfairly colluding monopolistically to underpay for Portuguese wine and overcharge for English cloth.

In 1750, an authoritarian Portuguese minister, the Marquis de Pombal, realized the cause of the problem lay not in evil merchants but was a natural outcome of the specializations. To combat wine overproduction, Pombal set about limiting the amount of area that could be allocated to wine production, limiting it to a specially **demarcated region** in the upper Douro valley. On the demand side, Pombal set about promoting wine as a luxury product, fostering the creation of fortified '**Port wine**' from the Douro region and marketing it as a luxury for English tastes. Finally, conveniently reinterpreting the wording of the Methuen treaty to indicate free trade applied only to woolen cloth, the Marquis blocked imports of English cotton cloth and set about resurrecting the Portuguese manufacturing by nurturing the erection of an import-substituting Portuguese cotton cloth industry.

By such heavy-handed State involvement, Pombal managed to reverse the decline in terms of trade and revitalize the Portuguese economy for a few decades. When he fell from power in the 1780s, most of his policies were reversed by the new government.

(2) Western & Eastern Europe

In the 14th C., merchants of the '**Hanseatic League**' of northern German cities had pioneered the opening of trade routes in the North and Baltic Seas. The trade range of the Hanseatic merchants extended across northern Europe, from Britain to Russia. Their sturdy cogs transported all manners of goods between the nations along their routes and encouraged the development of regional specializations: English wool, Flemish cloth, Danish herring, Polish grain, Baltic timber, Russian furs & wax, etc.

In the course of the 16th C., as the Hanseatic cities fell into political troubles, the routes they had opened were taken up by a new upstart commercial power: the Netherlands. The old trade relationships were widened and deepened by Dutch merchants.

Poland, with its great vast flat hinterlands, was an ideal producer of grain, while a fledgling manufacturing industry in finished cloth and metalwork (tools, etc.) had sprouted in tiny, crowded Netherlands.

As grain is a necessity and cloth & tools a luxury, the outcome was, once again, predictable. Polish landowners got immensely wealthy at first, exporting their grain to the bread-starved Dutch. Gradually, as Dutch merchant expertise expanded, vessels began carrying Polish grain not only to Holland, but also to fulfill the grain demand of countries further west, like England, France, Spain and Portugal. That only encouraged the greater specialization and expansion of grain production in Poland.

Inevitably, stagnation set in. Polish crafts industries were shut down and productivity growth suffered. The terms of trade began turning against the Poles, as overproduction and slow demand growth dragged down grain prices relative to cloth & tool prices.

But no wise Polish minister rose to the occasion and tried to reverse the trend. The machinery of the Polish state was too politically decentralized, in the hands of too many competing noblemen, for the State to take effective action. So, independently of each other, Polish landlords reacted to the lower revenues the only way they know how: by expanding grain production on their lands and trying to sell even more. But that only drove down grain prices faster.

Before: Grain pays (*zboze placi*)
(Obsequious Dutch merchants bow to rich Polish landlords)

After: Grain does not pay (*zboze nie placi*)
(Obsequious Polish landlords bow to rich Dutch merchants)

Fig. –Declining Terms of Trade in the Polish grain trade

The expansion of grain production and declining terms of trade prompted Polish landlords to implement a terrible cost-saving innovation to restore their dwindling profits: **serfdom**. Up until the 16th C., the Polish peasant & laborer had hitherto be one of the freest in Europe, able to move between employers and contract freely. No longer. The landlord-dominated Polish parliament began passing law after law that gradually snuffed the freedom of the Polish peasantry and tied them forcibly to the land and master.

Poland was not unique in this. Nearly all Eastern European countries which had been become connected, first by the Hanseatic League, later by the Dutch, by trade to the West followed this dependency pattern: Hungary, Brandenburg-Prussia, Poland-Lithuania and finally Russia itself. They all specialized as primary commodity exporters in return for western manufactures, all found themselves facing low growth and declining terms of trade in the long run, and all resorted to introducing serfdom, enslaving their own workers, in an effort to keep their profit margins afloat.

Without actual colonization, by means of trade alone, the development gap between Western and Eastern Europe grew wider and wider. It was only in the late 19th/20th C., when forceful rulers in Eastern Europe began taking measures – often quite violent and bloody measures -- to break-out of their stagnant primary specialization and begin the process of industrialization.

(3) North & South

Slavery & violence also famously marked the transition of another country out of primary commodity specialization: the United States.

During the colonial period, Mercantilist laws had marked the American colonies producers of primary commodities and raw materials - cotton, indigo, hemp, pitch, timber, iron ore, etc. - for nascent British manufacturing industries (cloth, metallurgy).

After independence in 1776, although Mercantilist laws were gone, trade with Britain continued and little was done to change these specializations. On the contrary, they were deepened. In the first half of the 19th C., Britain underwent an industrial revolution, at the spearhead of which was cloth-manufacturing. The great cloth-weaving mills of Lancashire required raw cotton as a input. And they looked abroad to supply it. In 1840, more than 50% of the entire world's cotton crop was destined for British textile industries.

In response to increased British demand, cotton plantations – and slavery – in the American South were rapidly expanded and deepened. America's dependence on primary commodity production *grew* rather than receded. By 1860, some 85% of the exports of the United States was raw cotton. Much of the remainder were other primary commodities, like iron ore, indigo, tobacco, rice., etc. The United States seemed destined to remain a primary commodity producer, overwhelmingly agricultural-based.

Throughout the 19th C., American manufacturing was negligible and struggling. American-made cloth could not compete on price with imported cheap, industrial-made British cloth that flooded the American market. So American manufacturers, many of them in the northeast, began pressing Congress for a protectionist tariff against British cloth, to give their industries a chance to compete and take root.

Ranged against them were the plantation lords of the South. They feared retaliatory British tariffs on their cotton exports. Southerners did not accept the Northern argument that a growing American cloth industry could substitute for British markets. British industry was so much larger and more developed than the American equivalent. Being still small and unproductive, American cloth manufacturers could not hope to offer as good a price for Southern cotton as the British manufacturers could, nor could they sell Southern consumers manufactured cloth as cheaply as the British did. In Southern calculation, a US-wide tariff would turn the terms of trade against them – what they produced would sell for less, what they consumed would cost more to buy. A protectionist tariff would hit Southern pocketbooks, and hit them hard.

The battle over the tariff was bitterly fought throughout the 19h C. between Northern and Southern representatives in Congress. Northerners demanded protectionism, Southerners demanded continued free trade. Whenever northerners gained the upper hand in Congress, the federal tariff was pushed upwards. Whenever southerners managed to get in the saddle, the tariff was pulled downwards.

In 1828, Northerners gained the upper hand in Congress and managed to pass a stiff protectionist tariff – the 'tariff of abominations' as it was known then. It caused a very serious quarrel as Southern states rallied against the tariff. Some Southern states, notably South Carolina, refused to collect the tariff at their ports even threatened to secede from the Union if the issue was pressed ('**Nullification Crisis**'). This quarrel nearly broke out in war, but it was quietly resolved with a compromise tariff in 1833. It was a dress rehearsal for what was to come.

Between the 1830s and 1850s, the to-and-fro over the tariff continued apace. Into this configuration entered the new states of the **West**, conquered in the Mexican-American War of 1848. Realizing that the entry of any new state into the union would tip the mathematical balance between Northern & Southern interests in Congress, Southerners insisted that they become slave states and thus aligned with their interests, while Northern representatives insisted the new states be free. Tariff calculations and the slavery question became more intertwined than ever.

Things reached an apex with the election of 1860. A new party, the Republican Party, had been formed, which promised three things on its platform: free states in the West, a protectionist tariff and a homestead act (hand out federal land for free to western farmers).

Experienced Southern politicians had defeated tariffs before by means of divide-and-rule politicking. They had forced free-slave compromises on new states. But the Republicans were different. They represented a shatter-proof coalition of Northern manufacturing interests (who wanted the tariff) with Western farming interests (who wanted the homestead act). Together, their representatives outnumbered the Southern delegations. Try as they will, perhaps too little and too late, Southern politicians failed to drive a wedge between them. The Republican coalition held together.

With the electoral victory of Abraham Lincoln and the Republicans in 1860, the Southern states knew the game was up. The Congressional mathematics were now against them, they could no longer use crafty politics to obstruct the passage of the Northern program. The triumphant Republicans announced a highly protectionist tariff – the **Morrill Tariff** – as the first item of the Congressional agenda of 1861. The Southern states promptly seceded from the Union, and the Civil War began.

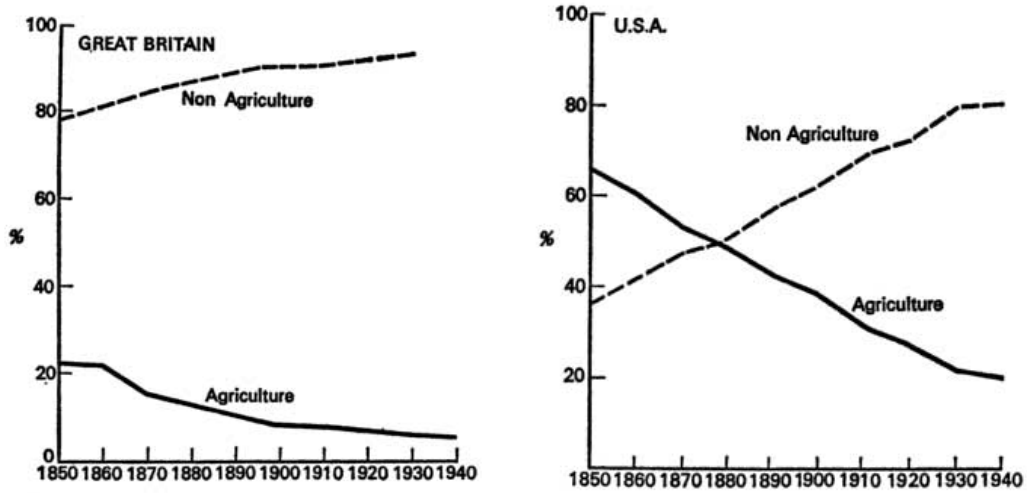
While I don't want to leave the impression that the American **Civil War** was *about* the tariff rather than slavery, the tariff calculation certainly loomed large in the list of Southern grievances and may have been decisive in determining the exact *timing* of the secession. For Southern plantation lords, the protectionist tariff was a serious pocketbook concern, almost as important as slavery itself, and, as we have seen, had long been an area of acrimonious quarrels between Northern & Southern representatives in Congress.

But in a larger sense, the Civil War was not merely a war over slavery or tariffs, but over the nature of the country itself. Is the United States going to be an industrial or agrarian nation? Self-sufficient or entangled abroad? Is the elite going to be composed of enlightened country gentlemen or *arriviste* industrialists? Jeffersons or Hamiltons? This debate, this tug-o'-war, had been raging from the start of the nation's birth, long before tariffs or slavery hit the headlines.

The question was decided bloodily in the battlefields of 1861-65. The Southern states were decisively defeated, and with it, the plantations lords exited history. From 1861 until 1913, the United States maintained a highly protectionist tariff, and the country was gradually weaned off dependency on primary commodities and went through the process of industrialization in 1870s-1880s. True, Western farmers and their commodities continued to

loom large in American economy during these decades, but the country was no longer exclusively agricultural. An industrial and manufacturing base grew, taking an ever larger share. By 1920, the United States was the largest manufacturing nation in the world, producing some 20-25% of the world's industrial output.

But it was a close-run thing. If not for the Civil War, had the Southern plantation lords remained in their Congressional seats and continued, by deft politics, obstructing the passage of industrial-friendly tariffs & legislation, the United States might well have remained an agricultural nation, dependent on primary commodity specialization. Its subsequent history would likely have run along the familiar grooves of long-run stagnation, as experienced in countries with similar starting point & demographics, like Brazil and Argentina, rather than industrial prosperity.



Great Britain United States

Fig. - Distribution of Agric. & non-Agric. workers, 1840-1940