

## Chapter 5: History, Expectations, and Development

### Introduction:

Remember that the Solow model of growth predicted that if savings rates and if population growth rates are the same for two countries, and if technology moves freely between countries, then the two countries will converge over time in terms of per capita income.

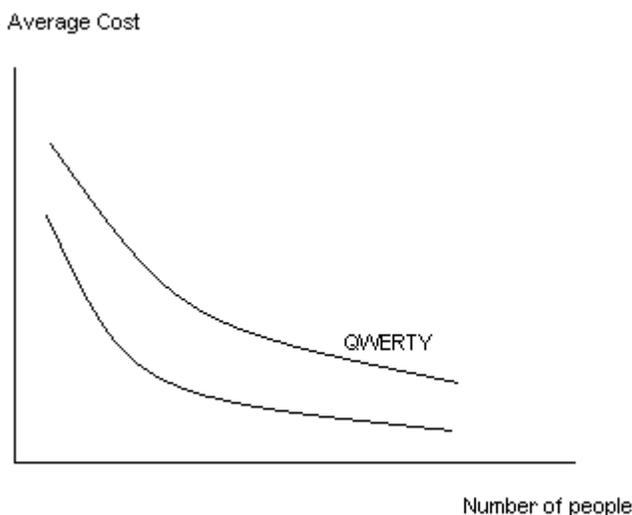
Such conditional convergence statements usually rest on the exogeneity of the parameters. But what if there is an underlying characteristic that determines these parameters? What if such characteristics are dependent on the country's history or the expectations of its people?

Therefore, we need an explanation of why investment rates are different in the first place, or why a given saving rate yields different growth rates in different countries. People all over the world are intrinsically the same, they are all human beings with the same hopes and desires. Then, why do cultures and economies behave so differently? We need to think about the roles of history and expectations. These interact and work through two main channels: complementarities and increasing returns.

### Complementarities:

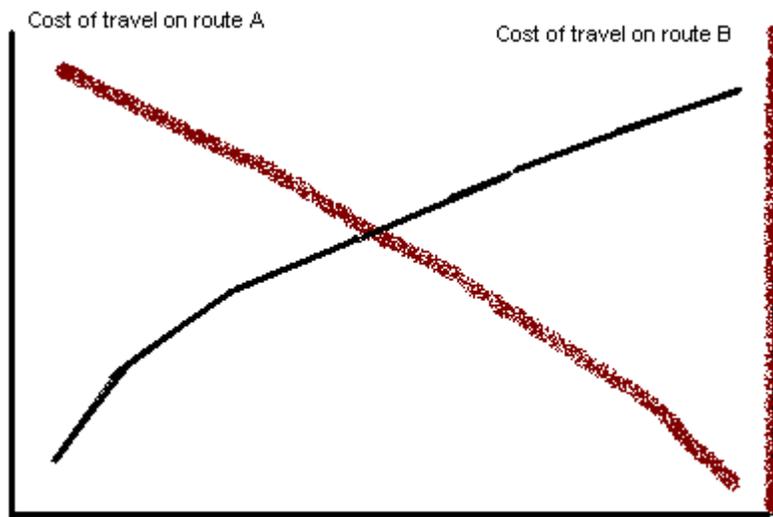
The QWERTY example: This keyboard arrangement was created to help avoid typebar tangles caused by hitting two keys in very quick succession or at once. The alternative design, the Dvorak system is more efficient and has proven to increase typing speed. Yet, the QWERTY system is much more prevalent. Why?

Answer: Your keyboard choice depends on what others have chosen. This is an example of a complementarity. The cost or benefit of adopting a system by an individual depends on the number of other individuals that have adopted the system. On the diagram below, show the average cost of adopting the QWERTY system when there are already  $N$  users of the system. Compare it to the cost of adopting the alternative system when there are only  $n$  users,  $n \ll N$ .



Depending on historical experience, the economy may settle at any one of the two equilibria: QWERTY or the Dvorak. Once one system is adopted, everyone else will choose to adopt the same system, even though the other system is more efficient. Historical lock-in.

Multiple equilibria exist when externalities take the particular form of a complementarity. When externalities are such that the cost of an action increases with the number of adopters, they cannot be responsible from multiple equilibria or historical lock-in. Example: Two alternative traffic routes, A and B. The more congested the route, the higher the cost of travel to the commuter. This is exactly the opposite of the QWERTY example. Here, both routes will be used.



In equilibrium, the number of users in routes A and B will be such that the costs are equalized, regardless of which route was built first. History does not matter.

We learn three things:

1. When there are externalities, multiple equilibria may exist.
2. Which one of these multiple equilibria a society finds itself in depends on history.
3. Historical lock-in occurs when externalities take the form of complementarities.

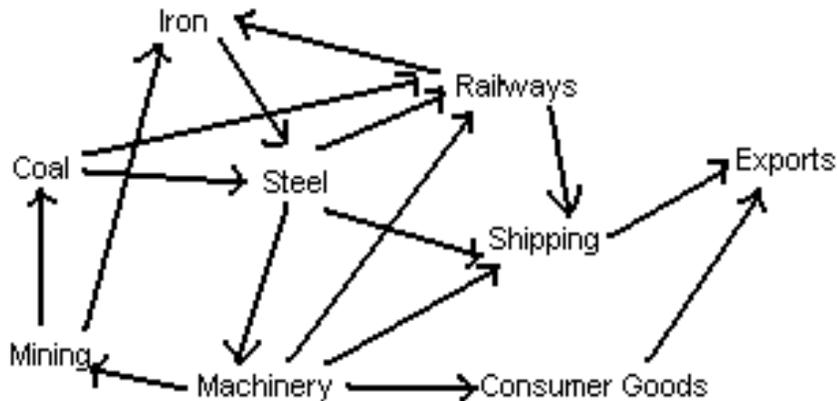
Coordination failure: We have seen that an economy might get stuck in a low-equilibrium trap when there are complementarities. Escaping from this bad equilibrium and reaching the good equilibrium requires coordination of actions. This view of underdevelopment is based on the 1943 Rosenstein-Rodan paper. According to this view several investments do not occur simply because other complementary investments are not made.

Suppose that people spent 50% of their income on food, 30% on clothing and 20% on shoes. Then setting up these three industries so that they produce \$5 million worth of food, \$3 million worth of clothing and \$2 million worth of shoes (when total personal income is \$10 million) would generate income that would keep these industries alive. Notice that none of these three industries would be viable if the others did not exist. For example, if only the shoe industry existed in the country, then for it to be viable all income would have to be spent on shoes, which

is absurd.

If no entrepreneur is rich enough to invest in more than one industry, then we can see that each entrepreneur will invest only if he believes that the others will invest as well. Thus, there are two equilibria, one with investment and one without. Coordination depends on the expectations.

Let's now define backward and forward linkages.



*Backward and forward linkages:*

The arrows in the above diagram suggest that one industry might facilitate the development of another by easing the conditions of production. For example the steel industry facilitates the development of other industries such as machinery and railways by increasing the availability of steel and/or by lowering its price. This is an example of a *forward linkage*. It works by easing the supply of another product. The steel industry has a *backward linkage* to the coal industry, because the expansion of steel industry raises the demand for coal. Backward linkages are like "pulls" and forward linkages like "pushes".

Suppose the economy is in a depressed equilibrium, and many of the sectors either do not exist or are at a very primitive stage. What kind of a policy can bring the economy to a better equilibrium? The idea of *big push*, by Rosenstein-Rodan, proposes that we invest simultaneously in a number of different sectors of the economy. Such a policy requires huge sums of money (which probably necessitates foreign aid) and the knowledge on the quantitative allocation of investments across different sectors. In other words, the government must not only have access to funds to make these investments but also know exactly how much to invest in each sector. Is this too much to ask?? Yes, most probably. This is one criticism to the big-push idea.

Another criticism to the big-push, by Hirschman, is that this theory does not make use of the fact that the desired outcome is also an equilibrium. This means that, if incentives are provided carefully, the market itself will correct the coordination failure. Hirschman suggested that a country deliberately follow an unbalanced growth policy and promote development of certain key sectors, instead of investing in all of them simultaneously, and let the market respond and make

the other investments.

How should we choose these key (or leading) sectors, if resources are scarce and simultaneous investment in all sectors is not a feasible option?

1. The number of linkages that a given sector possesses: Look for the largest number of sectors that will be affected as a result of the development of the chosen sector (nontrivial)
2. The strength and the character of each linkage matter as well. From the point of view of the sector that benefits from a backward linkage, the linkage raises the price of its output and stimulates higher production. However, a forward linkage reduces the price of one input among many. The falling input price may affect more than one sector, therefore the effect may be small for each sector and may not lead to higher investment in the sector.

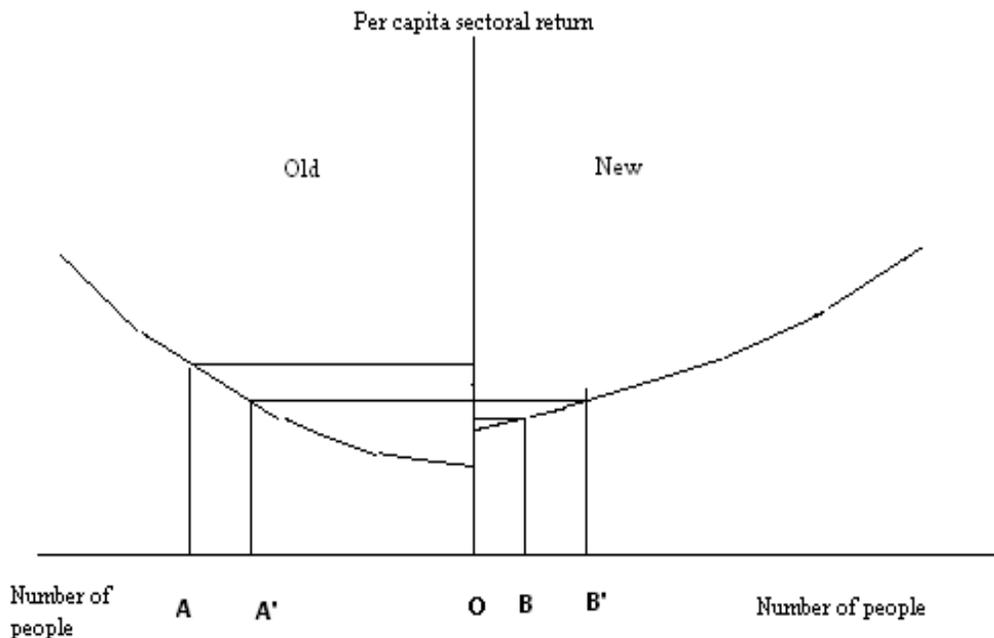
For example, an expansion of the shoe industry may turn leather into a profitable business, by increasing demand. However, it is not clear what the expansion of coal industry might lead to; there are many possibilities. In a nutshell, backward linkages have more direct and sizable effects.

3. “Intrinsic profitability”: Suppose we have two alternatives for a leading sector; highways and the export sector. Suppose we find that highways mostly have forward linkages whereas the export sector is richer in backward linkages. Should government pick exports as the leading sector and invest in its development at the expense of highways? Not necessarily. The government should invest in highways, because the private sector is more likely to find exporting profitable compared to operating highways (due to political or economical infeasibility of charging highway tolls in developing countries). *Here, the government maximizes the chances of overcoming coordination failure by investing in the least profitable activity.* Therefore, a leading sector does not have to be intrinsically profitable (heavy industry, transportation and agriculture are examples), but it must stimulate other sectors that are profitable.

### History versus Expectations:

Suppose that the development of electronics industry depends on a steady and reliable supply of engineers. Suppose that there are educational opportunities for engineering education in the country and that engineers would earn a high rate of return if the electronics industry existed.

Problem: How would the industry develop on its own if the present situation of an absence of skilled personnel and know-how makes the costs of investment very high? In the beginning, the demand for skilled personnel will be low, leading to low rate of return to education, yielding a very small number of graduates. Only when the demand for skilled personnel is high will students find it rational to study engineering. But the demand for skilled personnel will be high only when the industry can make profit by selling products designed by skilled engineers. (Another example of coordination failure.)



Now, let's generalize this example and suppose that there are two sectors; old and new. There are OA people in the old and OB people in the new. The return to any one individual for participating in a sector depends on the number of people already in the sector. (There are externalities.) Assume that the length of AB, that is the total number of people in the economy, stays the same, but the position of the line segment may change as people switch from one sector to the other.

Notice that in the figure the rate of return line in the new sector is higher, however with the current allocation of people to the old and new sectors (OA people in the old sector and OB people in the new), the rate of return is higher in the old sector. In time, people will move from new to old. This is an example of an exciting new sector with not enough critical mass to stay alive. Private markets have failed to incorporate the social externality, leading to an inefficient outcome.

What if things were different? Suppose there were initially OA' people in the old sector and OB' people in the new. In this case the rates of return would equalize. A slightest shift toward the new sector would move the entire mass from the old to the new sector in time.

This is another example that shows that complementarities precipitate a coordination failure and that history determines which equilibrium will prevail. We might think that if everyone in the economy believed that everyone would be in the new sector tomorrow, then, regardless of history, everyone would want to move to the new sector. But in reality changes occur slowly. The rate of return to skilled engineers does not increase immediately, but it increases in time, as the electronics sector develops. In this case, agents will wait until the rate of return in the new sector climbs above the current rate of return in the old sector. If all agents behave in this way, then

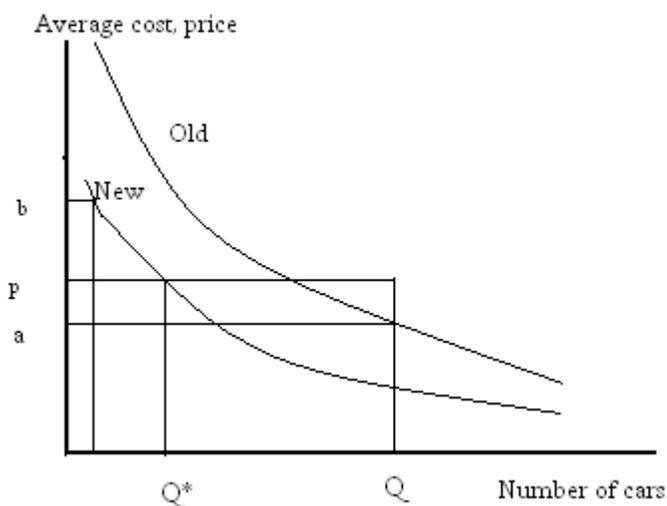
everybody waits, nobody wants to be the first. Once we take into account the time factor, we see that expectations play no role and history determines the entire outcome.

There are instances in which expectations might overcome history. Contrast the fashion industry to the electronics industry. With fashion, everybody wants to be the first. Clearly, expectations can play a role when there is an advantage to being first. As a specific example, suppose that people expect a certain part of the city to be popular in the future. If first movers benefit from low real estate prices, then people will want to be the first to move to this part of the city. Here, people believe that others will move as well and they compare the cost of moving now to moving later. Here, expectations overcome history.

### **Increasing Returns:**

Remember that an industry displays increasing returns to scale if an expansion in the scale lowers the unit cost of production. Equivalently, a proportionate increase in the variable inputs leads to a greater-than-proportionate increase in the output.

Suppose that a developing country has a small domestic market for cars. The market is currently served by imports from developed countries. Imagine that a local firm designs a fuel-efficient and low-production-cost car that is perfectly adequate for the road and traffic conditions in the developing country, if not very suitable for driving in a developed country highway. The firm realizes that because of the increasing returns to scale in the production, it will have to produce a high number of cars in order to reduce costs to profitable levels. Its rival, the foreign firm is already dominating the market and is enjoying a low average cost due to its large production scale.



Since the new design by the local manufacturer is more efficient, it has a lower average cost curve. Its average cost curve is uniformly lower than the average cost curve of the foreign firm. Both curves are downward sloping due to increasing returns to scale in the industry.

The problem that the domestic manufacturer faces is that currently  $Q$  number of cars are being sold in the market at price  $p$  and the rival firm has a unit cost of  $a$ . The local firm has a very small market share (close to zero) and thus faces a very high unit cost, such as  $b$ . Currently, the foreign firm is making a handsome profit  $(p-a)$  per unit. However, the local firm has to increase its sales at least to  $Q^*$  in order to reduce its unit cost to  $p$ .

Consumers will realize the merits of the new design and will switch to it. But this will not happen instantly. In the meantime, the local firm has to function at a loss. If the local producer could get a loan to cover its initial losses if capital markets were perfect. However, if capital markets are imperfect or missing (which is usually the case), the new design will not enter the market, although it is definitely better than the alternative.

This problem is caused by increasing returns, imperfect or missing credit markets and slowly switching consumers. In the absence of increasing returns, the other two pose no problem.

To conclude, if the society perceives that a new technology cannot invade existing markets due to either increasing returns (as in the above example) or to positive externalities at the society level, and the new technology can only be developed at a cost, then the incentives to develop it are seriously harmed.

#### The interaction of increasing returns and market size:

How do increasing returns and market size interact?

One example is the provision of intermediate inputs that are required in the production of the final output. A feature of economic development is the creation and use of increasingly sophisticated methods of production.

Let's take the example of construction. In many developing countries, construction is a labor intensive activity. In industrialized economies construction is more capital intensive. The whole task is broken down into a number of steps, each of which requires a certain degree of sophistication and the provision of many intermediate inputs. These intermediate inputs are often produced under conditions of increasing returns to scale. Think about the cranes used in construction and the inputs needed to produce the cranes themselves. For cranes to be produced profitably, there has to be a large demand for them. Producing them for a tiny market could be extremely costly.

How can this lead to multiple equilibria?

In a poor economy with low demand for the final product, the production of intermediate goods cannot occur at a viable scale, which means that the prices of these inputs are high. Therefore, firms will prefer using cheaper inputs (such as raw labor) in the production. This lowers productivity and generates low income in the economy. Low income generates a low demand for the final good. (The vicious cycle is complete.)

What is the other side of the coin? A virtuous cycle. High demand for the final good increases the demand for intermediates. Since the intermediates are produced under increasing returns to scale technology, their prices fall. Falling prices further encourage the producers to substitute away from labor to intermediates. Productivity increases, incomes rise and so does demand, completing

the virtuous cycle.

Notice that increasing returns is crucial for this argument. With diminishing returns we would not see such a chain of cumulative causation or multiple equilibria.

### **Other roles for history:**

Social norms: Although we talk about rational individuals, what individuals can do is often moderated by what the society thinks is acceptable. Is it acceptable to cut in line? Is it acceptable to break ties with family and relatives? Is it acceptable for women to work outside home? Is it acceptable to charge interest on a loan?

It is true that without norms of decency and appropriate social conduct, economic life would fall apart. However, there are situations when norms need to be changed. But the ones who are brave enough to initiate such change often face harsh criticism and even isolation. We can see the similarity of this with the story about complementarities and multiple equilibria. Adhering to the norm is the bad equilibrium. The more individuals conform to the norm, the more difficult it is to depart from it. As individuals depart from the norm, it becomes easier for others to depart as well.

The status quo: History establishes status quo and status quo determines whether a new policy can be undertaken.

Most new policies have winners and losers. Normally, we would add up all gains and losses to determine the viability of the new policy. Initially, it may be hard, if possible, for individuals to determine whether the new policy will harm or benefit them. It may be hard to evaluate the extent of losses and benefits. Under uncertainty, even projects that are known to be beneficial may be rejected by the society.

Assuming that the losses and benefits can be assessed, the policymaker may promise to compensate the losers, but such promises may not be incredible or implementable. In this case, the method of adding up all gains and losses to determine the viability of the new policy simply loses its relevance. Viability will depend on lobbying. The group that lobbies harder will impose its own view. Certain policies may be enacted even when losses outweigh gains.