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Increasing Returns

Erik:

Could you explain the difference between diminishing returns and increasing returns? Is increasing returns similar to economies of scale?

Diminishing returns is the economic law that governs commodity type businesses like coffee and steel. Let's suppose that you are a coffee grower. You first plant the best lands and that produces a certain yield per acre. As the demand for coffee grows, you are forced to use additional land which is not as good as your original lot so the yield per acre or the yield per dollar of input will be less -- diminishing returns.

Compared to modern knowledge based industries, commodities required relatively little or no intellectual input from the workers. The knowledge was concentrated at the top and that is why a command and control, pyramidal, management structure worked well.

Economies of scale were precisely a mechanism used by those industries to try to offset the diminishing returns. Building larger, more efficient factories, where the same number of managers could command a larger work force, helped offset diminishing returns but could not stop it altogether.

Classical economists liked diminishing returns because it is predictable. In diminishing returns there is a calculable equilibrium point between supply and demand that can be forecast using the right mathematical tools. This ability to forecast gave the economists a measure of respectability and economists enjoyed that respect.

Increasing returns is the economic law that governs modern knowledge based businesses such as software. The **user** has to invest a large amount of effort to learn to use a technology and then does not want to change for the sake of change. Take automobiles. They have three pedals, from right to left, accelerator, brake and clutch. When you learn to drive one car you learn to drive all cars. Now

suppose that someone figures out a more efficient arrangement of the three pedals and changes the order. Would you want to drive such a car? Highly likely you will smash it up at the first emergency because your reflexes will be wrong for that odd configuration of pedals. In modern lingo, don't mess with the user interface.

Increasing returns means that "The More You Sell, the More You Sell." but the winner of technological competition is not predictable. Mathematics does not come up with a single equilibrium point but with several of them and any one of them can be the one chosen by chance. There are several factors at work here. Path dependence is an interesting one. Suppose two or more technologies set out to compete. In automobiles that would be electric cars, steam driven cars and the internal combustion engine. For some reason one of the three is picked more often than the others at the beginning and after a while path dependence sets in and the more you sell the more you sell. The Gorilla Game is predicated on increasing returns -- whoever happens to win the architectural wars gets the king's ransom.

Path dependence is the reason not to buy shares before a product has entered the tornado -- path dependence has not yet set in. Before the tornado it is practically impossible to tell who the winner will be.

With decreasing returns, a somewhat lower price can induce a buyer to switch. Not so with increasing returns where you need a very large change in price to induce a user to change -- **you need to overcome the "high switching costs"**. That is why commodity businesses tend to operate very close to their break even point while knowledge based business tend to have pricing power in the face of competition. Warren Buffett buys consumer commodities such as Coca Cola and Gillette but he is very careful to select those that have high recognition brand names which is what gives them their pricing power. How many people order a Run and Pepsi? If they prefer Pepsi over Coke they are liable to order a Run and Coke with Pepsi instead of Coke. That requires a lot more effort than simply saying, "Give me a rum and coke."

For a fuller explanation of increasing returns, I suggest the following readings:

Increasing Returns and the New World of Business,"Harvard Business Review, July-Aug 1996.

Pdf - http://www.santafe.edu/arthur/Papers/Pdf_files/HBR.pdf

MS Word - http://www.santafe.edu/arthur/Papers/Pdf_files/HBR.doc

The More You Sell, the More You Sell

<http://www.wired.com/wired/archive/3.10/arthur.html>

Excerpt:

Arthur: Well, today our economy is based pretty heavily on high tech, not on soybeans or coal. High tech, so far as we can see, operates according to increasing rather than diminishing returns. The more volume you have out there in the market - the larger your installed base - the more market advantage you have. Until recently, economics didn't have any well-articulated theory to deal with this. With high-tech products that involve communications or hooking into a network, "network externalities" come into play. The more people use Unix, the more people feel compelled to adopt Unix over Windows. By the same token, people tend to "groove in" to dominant high-technology platforms, so that the more they use their software, the more they become enslaved to the software and all its upgrades.

Preface to the book: Increasing Returns and Path Dependence in the Economy, Univ. of Michigan Press, Ann Arbor, 1994.

Pdf - http://www.santafe.edu/arthur/Papers/Pdf_files/Preface.pdf

For additional reading material, visit Arthur's Home page at the Santa Fe Institute

[Brian Arthur/](#)

BTW, if you are interested in how the Santa Fe Institute got started and the work they do, which in my opinion is fascinating, read M. Mitchell Waldrop's popular 1992 book [Complexity: The Emerging Science at the Edge of Order and Chaos](#).

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