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Measuring the Effect of Consumption and Human Capital Development
on Industrialization

Much of the research in economic history and development economics focuses on the large question of why some nations were able to industrialize in the past while other nations continue to economically stagnate to this day. Many scholars have debated over what are the real drivers of industrialization. In his book *The Lever of Riches*, Joel Mokyr outlines the four different theories for how economies can grow and become “developed”. The first is Solow growth, or growth by capital accumulation. The second is so called Smithian growth, or growth through more trade. The third is growth by increasing returns to scale, and the fourth possibility is growth through the acquisition of knowledge. Mokyr claims that it is the spread of knowledge that is the most important. This paper posits that the reason we see such large national income disparities today is a lack of human capital accumulation in poorer countries caused by a lack of complete technology spread through lack of consumption of technologically advanced goods.

According to Gershenkron, the farther a nation is off the production possibilities frontier, the faster it will industrialize once the ideas of technology are spread (Gershenkron, 1962). However, we see a clear divergence from this idea in the many of the underdeveloped nations of the world today. There are numerous nations that could easily attain enough technology to catch up to already industrialized places, but have not yet done so. It is possible that once a nation gets too far off the production possibilities frontier, it becomes exceedingly difficult for the country to develop the necessarily human capital to completely industrialize and therefore to completely catch up to

developed nations. Thus, instead of quickly accelerating to the production possibilities frontier, these nations stay at interior, inefficient points.

The importance of human capital has been discussed on many different levels. In their 1984 paper, Golden and Sokoloff show that relative labor productivity is an important factor in determining whether or not an area will industrialize. They discuss human capital in a way that shows why certain demographics, mainly women and children, would move out of agriculture and in to manufacturing. This paper focuses on a different time period and place, the United States in the early 19th century, than developing countries of the present, however.

In order to properly use the most cutting edge technologies, nations generally need a work force that has some familiarity and training with high tech equipment. Engineering schools are a good way to do this, but it can be an expensive endeavor to train a work force properly in this way, especially if a nation is in extreme poverty. Therefore, one would expect poorer nations to mostly have informally trained workforces. For the purposes of this paper, I will assume that the best sort of informal training is long term contact with a technology.

The technologies and products involved with industrializing have changed vastly since Britain industrialized in the 18th century. The products associated with the cutting edge of industrialization in Britain at the time of its industrialization were textiles. Now the cutting edge of consumer technology is characterized by computers and high tech electronics. In Britain in the 18th century, it would have been a relatively easy jump for people to start working in factories producing textiles, a product every worker would have been familiar with. In developing countries now, it is more difficult to see this jump

as being possible, as much technologically advanced electronic equipment and computers are out of reach of the poorest people in the world.

In order to test this possibility, I will define a timeline of the most advanced groups of consumer goods since 1800. This timeline is somewhat arbitrary, but for the purposes of this paper there needs to be some sort of division. From 1800 to around 1850, these goods were textiles; from 1850 to around 1920, I will say the most typical product of industrialized nations was steel; from 1920 to 1980, it was heavy machinery and automobiles; and from 1980 to the present it is computers.

In this paper, I will look at a broad range of nations, from Germany to Japan to India, nations that have already industrialized and nations that are yet to industrialize. I intend to use when a working stock market was established in the nation as a rough proxy for the nation attempting to set up free markets and turn into a modern industrial state. First I will see in which of the date buckets the establishment of the stock market falls. Then I will see how much of each of the past and present consumer goods the nation was both producing and consuming at the time. If the nation was already producing a large amount of the goods compared to how much it was consuming (some fraction, say one half of what it consumes it also produces or larger), then that data will be neglected for causality reasons as it will be possible to say whether or not the nation was producing because it was consuming or visa versa. I will make an exception to this rule in the case of textiles, however, as developing countries manufactures manufacture much of the world's textiles already and I would end up throwing away all the data. This exception is reasonable, however, because textile manufacturing today is low tech compared to other modern heavy industry and electronic manufacturing. It has, however, not always been

the case that richer nations have outsourced their textile production to developing countries. In fact, for a long while, many nations set up high tariffs on imported cloth in order to allow domestic industry to grow. Therefore, I will only make this exception for countries that I claim started to industrialize after 1950.

Once I have determined how many of the available technology levels the nation was consuming at the time of its attempt at industrialization, I will look at GDP growth data. The goal is to see if there is a level of consumption that is too outdated in a nation for it to develop modern human capital and grow. Therefore, the number of technology buckets being consumed given what technology has been developed versus how much the nation subsequently grew is the final result I look for.

There are a few problems I can foresee in this project. The first comes from the fact that I will have to throw out the nations that were already both consuming and producing the given goods at the time of industrializing or were just producing them and not consuming them. This problem could create a bias in the results. To try to avoid this problem, I could also carry out the comparison to GDP growth in these nations that I would throw away and see if there are any large differences in the results. If not, then I could conclude that no bias is created. Another problem is that many of the dates and boundaries I have created are somewhat arbitrary. A third problem is that there are fewer technologies to consider for countries that industrialized earlier. For example, in looking at the United States, I would only consider textile production but in looking at India I would look at textiles, steel, automobiles, and computers. Since many of the currently industrialized nations of the world industrialized in the 19th century, this problem could create another bias.