

## Development Policy

### Lecture Note 6

# Manufacturing as the Engine of Growth

In the previous lecture we discussed the Lewis “dual economy” model, in which movements of labor from the “traditional” to the “modern” sector are an important source of economic growth. Today we continue with an examination of the relationship between industrialization and economic growth.

The growth of manufacturing has been closely associated with economic development since the advent of the Industrial Revolution in Britain in the 19<sup>th</sup> century. The introduction of steam power and the application of new technologies to factory production, particularly in mining and textiles, led to dramatic increases in productivity and a transformation of both the domestic structure of production and world trade. Having observed the economic power that Britain acquired on the basis of the Industrial Revolution, other European powers and the United States sought to replicate this success and develop their own manufacturing sectors.

In the period after World War II, developing countries—including the former colonies of Asia and Africa and the independent states of Latin America—implemented policies to accelerate industrialization. The development of the manufacturing sector was seen as the engine of economic development. This was not just a theoretical proposition. During the period of the World Wars, Latin American countries like Argentina and Brazil were not subject to competition in the production of manufactures because the war had disrupted normal trade links. Under this form of natural trade protection, these countries had achieved rapid growth of domestic industries. On the basis of this experience, they attempted to sustain domestic manufacturing growth behind high tariff barriers and quotas. The logic of import substituting industrialization was based on the idea that domestic producers needed protection from world markets to learn new technologies and skills, and that after a period of time under protection these companies would emerge as competitive producers.

There was considerable optimism in the developing world in the post-war period regarding the scope for rapid industrialization. The Russian-born Harvard historian Alexander Gerschenkron noted that latecomers to industrialization like Germany, Russia and Japan had benefited from the ability to import technologies from the advanced countries. These “advantages of backwardness” meant that latecomers could quickly

catch up to the technological frontier.<sup>1</sup> In order to apply these technologies, however, latecomers would need to operate on a sufficient scale, which meant that government support and large financial institutions were needed to support industrialization.

Manufacturing as a share of GDP increased across the developing world from the 1950s, but most rapidly and consistently in Asia. Latin America entered the post-war period with a sizeable manufacturing sector, which grew until the 1980s behind trade barriers. The process came to an end with the debt crisis of the 1980s, when Latin American growth came to a halt and import-substitution policies were dismantled in an effort to generate revenues from exports. South Asia and Sub-Saharan Africa followed a similar trajectory. The countries of East and Southeast Asia were generally more export-oriented, particularly after the end of the resource boom of the 1970s and the Plaza Accords in 1986, which revalued the Japanese yen. Japanese foreign direct investment flooded into China and Southeast Asia as Japanese companies sought export platforms in countries with lower wages and cheaper currencies. Modularization of manufacturing, spurred on by technological change and trade liberalization, contributed to the continuing growth of manufacturing in Asia after 1990.

### Manufacturing as the engine of growth

Development theory has long held that manufacturing is the engine of growth in developing countries. Is this proposition supported by theory and empirical evidence?

Empirically, manufacturing does seem to be closely associated with development. At the simplest level, if we correlate the share of GDP in manufacturing and per capita income we find a reasonably close relationship. The scatterplot shows this relationship for 70 developing countries, omitting high income countries and major oil exporters. Although exceptions do exist, countries that rely more heavily manufacturing tend to be richer than countries in which manufacturing has not yet taken root.

More importantly, growth of manufacturing value added is very closely associated with GDP growth. We often call this Kaldor's First Law after the Cambridge economist Nicholas Kaldor, who strongly emphasized the importance of manufacturing in economic growth. The scatterplot shows this relationship for 50 developing countries over the period 1970-2010 (the countries were chosen on the basis of data availability). This is clearly a very robust relationship, and one that has not lost its force over time.

One obvious reason for the relationship between manufacturing and income per capita is that labor productivity growth is more rapid in manufacturing than in agriculture. This is the basis of the Lewis model that we discussed in the last lecture, and

---

<sup>1</sup> Alexander Gerschenkron, (1962) *Economic Development in Historical Perspective*, Cambridge: Harvard University Press.

structuralist growth models that we discussed in macroeconomics class. In countries that begin the development process with most of the labor force in low productivity agriculture, the development of manufacturing is generally associated with an increase in average productivity. Following Gerschenkron, late developers can achieve rapid productivity growth in manufacturing by importing technologies developed elsewhere. These technologies are embodied in the capital goods (machines) imported from abroad.

Kaldor sees manufacturing as the engine of growth because technologies in this sector are more likely to generate economies of scale than agriculture and services. Kaldor linked economies of scale to *learning by doing*, meaning the process of acquiring technological capabilities through practice.<sup>2</sup> The expansion of manufacturing generates more opportunities for learning and the development of skills. This explains the relationship underlying Verdoorn's Law, namely that the more rapid growth of manufacturing leads to an acceleration the productivity growth.

At higher levels of income, manufacturing generally declines as a share of GDP and the share of services increases. The reason for this trend is that people demand more services as their incomes increase, but it is more difficult to increase productivity in labor-intensive services than in manufacturing. Economies of scale are more difficult to realize in services than in manufacturing: a firm of one thousand lawyers is not necessarily more efficient than a firm consisting of one lawyer. The average productivity of a professor at a large university is not greater than a professor at a small college. The shift towards services is one of the main reasons that high income countries tend to grow more slowly than low income countries. However, the long-held belief that economies of scale are not available is now being challenged, as information technologies have contributed to an increase in productivity in some types of services.

As we saw in the Lewis model, increasing returns to scale in manufacturing generate profits and therefore promote capital accumulation. As new technologies are embodied in capital goods, more rapid capital accumulation should be associated with more rapid technological change.

On the demand side, manufactured goods are associated with a higher *income elasticity of demand*. The income elasticity of demand is defined as the percent change in quantity demanded divided by the percent change in real income. Manufactured goods do not have a uniform income elasticity of demand. As we get richer we demand more electronic equipment, motorbikes and automobiles, so these are industries that prosper as the global economy expands. But demand for specific manufactured goods falls at higher income levels—for example, inferior goods like cheap bicycles and gas lanterns.

---

<sup>2</sup> Nicholas Kaldor (1966) *Causes of the Slow Rate of Growth in the United Kingdom, An Inaugural Lecture*, Cambridge University Press.

Nevertheless, the positive relationship between demand for manufactures and income does tend to hold. Conversely, the share of spending on food declines as incomes rise. This well-established relationship is known as Engel's Law.

### Advantages of backwardness

Import substituting industrialization fell out of favor in the 1980s. High tariff barriers did enable domestic firms to capture local markets, but they remained heavily dependent on imported intermediate and capital goods. Expensive manufacturers reduced the competitiveness of agriculture, services and downstream industries. Small countries found that domestic markets were not large enough to realize economies of scale in manufacturing. Many countries ran persistent balance of payments deficits which they covered through borrowing, contributing to the 1980s debt crisis. Politically, ISI created domestic constituencies for trade protection that proved difficult to unravel.

The rapid growth of foreign direct investment and modularization of production stimulated the development of manufacturing in developing countries, particularly in East and Southeast Asia. Many of these new industries—for example, garments and electronic components—were more likely to be export oriented and labor-intensive. Others were oriented to the domestic market, but were not afforded high levels of protection. Both are cost-sensitive as they compete with exports from other countries or imports.

In the new era of export-led manufactures, does Gerschenkron's idea of the advantages of backwardness still apply? Are developing country manufactures trapped in low-tech, low wage assembly operations, in which price competitiveness is the most important factor? Or are developing countries in a position to capitalize on their low wages to import new technologies and building technological capabilities?

Fagerberg, Srholec and Knell (2007) make the case that technological diffusion is still a critical factor in the development of manufacturing in developing countries. First, they make the point that there does not appear to be a close relationship between price competitiveness (measured by unit labor costs) and economic growth. It is not the case that the cheapest countries are growing fastest. China, the fastest growing country in the sample, falls in the middle of the distribution with regards to price competitiveness. Some rather uncompetitive countries like Hong Kong, Israel and Ireland, recorded high rates of economic growth and growth of manufacturing.

Second, success in exporting manufacturers depends in part on the demand side, or which products the country exports. As noted above, exports of products with a higher income elasticity of demand are likely to grow more quickly. Fagerberg, Srholec and Knell do not use income elasticity of demand, but they use a related concept, ranking products based on how quickly export demand for them is increasing. Demand for

products with higher ranks is growing more quickly than products with a lower rank. As shown in the figure, the East Asian countries have recorded high rates of growth and have specialized in export products with buoyant global demand. African countries, by way of contrast, have grown slowly and specialized in products with slack global demand.

Next, the authors create indices of technological capacity (patents and published articles and scientific journals) and institutional capacity (education, financial depth and rule of law), and test the extent to which these variables—plus price and demand—are associated with rapid growth of GDP. They find that there is plenty of scope for latecomers to benefit from technological diffusion. The coefficient for initial GDP per capita is negative and large, suggesting that poor countries do grow more quickly. The authors also find that price competitiveness, although significant, is not as important as demand, technological readiness and institutional capacity. The success of the newly industrializing countries of East Asia is in large part due to their technological and institutional capacity, and their concentration in growing industries like IT, machinery and pharmaceuticals.

They conclude that policies should systematically put a high priority on improving technology and capacity competitiveness and exploiting the changing pattern of world demand competitiveness. Building social and technological capabilities remains the key to successful industrialization.