

Chapter 12. Development of Industries and Industrial Policy

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Section 1: Opening the country and the policy for modernization

In this lecture I discuss the economic and industrial development of modern Japan, and the role of government policies in that development.

I focus on the period from the late nineteenth century to the late twentieth century, when Japan succeeded in catching up with the advanced Western countries.

Let me show Japan's catch up progress using GDP data.

The blue line denotes per capita real GDP of the United Kingdom, which was the most advanced country in the nineteenth century, while the red line denotes the per capita real GDP of Japan.

Per capita real GDP is measured in terms of international dollar value against the base year of 1990.

It is notable that from 1700 to 1870, the gap between the UK and Japan expanded.

This can be regarded as a part of the so-called Great Divergence, that is the widening of differences in income levels between the West and the East, including Japan, China and India.

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However, after 1870 the gap between Japan and the UK declined, and finally in the 1970s, Japan caught up.

This later trend can be seen as a part of the so called Great Convergence, that is the convergence of income levels between the West and the East.

Japan was a front runner in the Great Convergence.

In this lecture, I will show how Japan achieved this.

The starting point was the opening of the country in the 1850s, when the U.S. fleet came to Japan, requesting open the country.

At that time, Japan was governed by a feudal government, the Tokugawa Shogunate, which had maintained a seclusion policy for more than 250 years from the early seventeenth century.

However, facing military pressure from the U.S. fleet, the Shogunate decided to accept the request of the U.S.

The abolition of the seclusion policy resulted in political conflict in Japan; a civil war began between the Tokugawa Shogunate and contending feudal domains in 1868.

The contending feudal domains beat the Shogunate, and founded a new government under the reign of the Emperor.

Given the military threat from Western countries, the basic goal of the Meiji government was to cope with this threat and preserve the independence of Japan.

This goal is reflected in the slogan announced by the new government, "Enriching the country and strengthening the military power".

To achieve the goal, the government seriously made efforts to learn from Western countries.

From 1871 to 1873, the government dispatched a mission of powerful political leaders and young students to Western countries, where they learned about modern institutions and modern technologies.

Section 2: Preparing the basic conditions for economic development

Learning from the West, the Japanese government established the basic conditions for economic development.

One of the essential conditions was to develop institutions that could support economic activities.

By 1890, most of the basic institutions were established.

In 1871, the feudal domains, which had previously had substantial autonomy, were abolished to build a modern centralized state.

In 1873, through land tax reform, the fiscal basis of the government was established.

In 1889, the Constitution was established, and through this the protection of property rights was confirmed, which is an essential precondition for economic development.

Concerning the currency system, at first, the government issued a large amount of non-convertible government notes, which resulted in high inflation.

In 1882, the Bank of Japan was founded as the central bank, which started to issue bank notes convertible to silver.

That is, Japan adopted the silver standard at first.

Later in 1897, Japan transited to the gold standard, following the world trend.

Finally, a banking system was introduced.

In parallel with the institutional infrastructure, the physical infrastructure of a modern nation was constructed as well.

An important part of this physical infrastructure was the railways.

This figure shows the length of railways in Japan.

The blue line denotes the railways run by the government and the orange line denotes the railways run by private companies.

We can see that the government initiated railway construction in the early stage, and private companies followed and soon took over this initiative.

By the end of the 1900s, the major lines had been constructed, and Japan was covered with railway networks.

Railways were indeed a great innovation in transportation.

Let me show the impact of railways by comparing railway travel with a traditional transportation measure, a palanquin.

In the case of transportation between Tokyo and Osaka, by palanquin it took 19 days, but by railway it took just 19 hours.

In terms of price, by palanquin it cost more than 11 yen including accommodation costs, but by railway it cost around 3 to 4 yen.

Thus, the new railways enabled substantial savings in time and cost.

There is a wide consensus among economists that human capital is a key to economic development.

The Japanese government made an effort to increase human capital through education in the Meiji period.

The education policy of the government is reflected in the average number of schooling years available to the people.

This figure indicates the average years of schooling for the working-age population.

The blue line denotes that of Japan, while the orange line denotes that of the US.

We can see that the average schooling years in Japan started to increase in the 1900s and continued to increase thereafter.

In 1940 it was 6.5 years. In other words, human capital formation proceeded steadily in the prewar period.

Section 3: Emergence of modern industries

Based on the institutional and physical infrastructure as well as human capital, modern industries emerged in Japan.

This figure illustrates the process of industrialization in Japan.

The blue line denotes the real production value of mining and manufacturing, while the red line denotes that of agriculture.

Although agricultural production increased steadily, the growth rate of industrial production was much higher.

Consequently, the percentage of production from manufacturing industry went up, especially from the late 1910s, as indicated by the green line.

A leading industry in this industrialization, especially in the early stage, was the textile industry.

The blue line denotes the real production value from the textile industry and the red line denotes the percentage of textiles in total manufacturing product.

We can see that the percentage was higher than 40% at its peak. Indeed, the textile industry led industrialization in Japan.

In starting industrialization, the government played an important role.

That is, the government established state-owned plants in some industries.

These state-owned plants included the Tomioka Silk Reeling Factory, the Aichi Cotton Spinning Factory, the Kamaishi Iron Works, and the Yawata Iron Works.

The main purpose was to adopt modern technology.

For this purpose, at those state-owned plants the government employed foreign engineers and installed imported equipment.

Let me talk about the Tomioka Silk Reeling Factory in more detail.

The Tomioka Silk Reeling Factory was founded in 1872.

A French engineer, Paul Brunat, was employed as the chief engineer and given a high salary.

He designed the plant, purchased reeling machines in France and employed French skilled workers.

More than 400 Japanese female workers were employed as well.

It played the role of a model plant for private firms, and it trained workers for private firms.

It is remarkable that modern silk reeling technology diffused from Tomioka to many private firms.

The owners and managers of private firms visited Tomioka and imitated the factory system and machines in their own plants.

This was the role of the government in the emergence of the modern silk reeling industry in Japan.

However, the role of private firms is also important.

Private firms did not directly adopt the Tomioka technology.

For example, they did not import silk reeling machines, which were expensive, but ordered Japanese carpenters to make machines imitating those at Tomioka.

In making domestic machines, they substituted wood and ceramics for metal, and thereby reduced the machine price substantially.

In terms of economics, what private firms did was to adjust technology to the factor price conditions in Japan.

Because France was a labor scarce and capital abundant country, the technology developed in France was too capital intensive for Japan.

This is the reason why Tomioka was unprofitable as a factory.

Given that, private firms found a way to adjust the imported technology to be more labor

intensive, and became profitable.

The silk reeling machines used at Tomioka and in a private firm are preserved at the Silk Reeling Museum in Okaya City.

The one on the left is a machine used at Tomioka, and the one on the right is that used at a contemporary private firm.

Although the shapes of these machines look similar you may see that the right machine is almost all made of wood.

This is the result of the effort of private firms.

As I said, a leading industry in the early stage of industrialization was textiles, but from the 1910s, new industries, namely heavy and chemical industries, were developed.

The red line in this figure denotes the percentage of heavy and chemical production in total manufacturing production.

This increased sharply in the late 1910s. After a decline in the early 1920s, it increased again.

An important turning point for the development of heavy and chemical industries was the First World War.

During the First World War, the import of heavy and chemical products from Europe almost stopped, and hence prices of those products increased sharply.

As indicated in this figure, steel prices increased more than five times compared with the prewar level and the price of soda increased more than three times.

These sharp increases in prices stimulated the entry of new private firms into the heavy and chemical industries.

When the First World War ended in 1918, the price of their products declined sharply, which is the reason for the decline in the percentage of heavy and chemical production in the previous slide.

However, as we have also seen in the previous slide, the percentage of heavy and chemical industries began to increase around the middle of the 1920s.

One of the reasons was learning during the First World War, but there is another fundamental condition.

In this figure the blue line denotes the index of user cost of capital with that in 1914 as a benchmark, while the orange line denotes that of the nominal wages.

During the First World War both capital costs and wages increased sharply.

On the other hand, in the 1920s, while capital costs declined sharply, wages remained stable at a high level.

As a result, in the 1920s, the relative cost of capital declined sharply.

This change was favorable for the capital intensive industries including the heavy and chemical industries, but unfavorable for the labor intensive industries including textiles and coal mining.

Section 4: War economy and postwar reconstruction

As we have seen, the Japanese economy continued to industrialize from the late nineteenth century to the early 1930s.

However, from the late 1930s, it entered a different phase by the impact of war.

This slide gives a brief chronology of the war situation that Japan experienced in the late 1930s and the early 1940s.

In 1937, the Second Sino-Japanese War broke out, which was the start of full-scale war for Japan for nearly 10 years.

Just after that, the Japanese government imposed extensive economic controls, including distribution control, price control and financial control.

In 1941 Japan started a war with the Allied Nations including the US and UK, which is called the Pacific War and was a part of the Second World War.

This war continued until Japan accepted unconditional surrender in August 1945.

The war had a huge impact on the Japanese economy.

This table indicates the macro-economy of Japan on the expenditure side.

Some observations emerge: First, real GNP was almost stable in this period. In other words, the war period was a period of zero growth;

Second, the basic reason for the zero growth was a decline in imports.

The Allied Nations imposed embargoes on Japan, and hence imports declined sharply; Third, during the period of zero growth, government expenditure increased sharply, and public and private capital formation increased as well.

This reflects the expansion of the munitions industries; finally, as a result, private consumption declined sharply.

In summary, a huge reallocation of resources took place in this short period.

The resource reallocation we observe in the macro statistics is reflected in the composition of industrial production.

This table indicates the production indices with 1936 as a benchmark.

We can see that the production of some industries, such as iron and steel, and machinery, increased sharply.

At the same time, the production of textile and food declined sharply.

Steel and machinery were mainly used for government consumption and capital formation, whereas textile and food were mainly used for private consumption and export.

It is notable that these drastic changes in resource allocation were not driven by the market, but resulted from centralized planning and control by the government.

Planning and control were introduced to mobilize resources for the war.

Economic plans such as the Material Mobilization Plan, the Production Capacity Expansion Plan and the Labor Mobilization Plan were drawn up annually or quarterly, by a government agency, the Planning Board.

These plans were basically plans for resource allocation.

Given the plans, government ministries operated economic controls to implement them.

Industrial associations, that is, associations of private firms, collaborated with the ministries.

The drastic resource reallocations we have seen indicates that this system of planning and control worked fairly well.

A product which was given top priority during the war was aircraft.

This figure indicates the number of aircraft produced in Japan in each month.

As you see, from 1942, aircraft production increased very sharply.

This increase reflects the mobilization of resources for aircraft production.

In addition to planning and control by the government, innovations by private firms were important as well.

An aircraft is a product composed of numerous parts.

To produce as many as possible in a given time period, aircraft producers organized many small factories as suppliers of parts.

This table outlines the case of a plant of Mitsubishi Heavy Industries, one of the two largest aircraft producers in Japan.

As you see here, Mitsubishi increased part suppliers during the war, especially in the later phases of the war.

This system of subcontracting is similar to that used in the present automobile industry.

The war caused serious damage to the Japanese economy.

Equipment and capital stock were destroyed, and many people were killed.

The damage on the Japanese economy is indicated in this slide.

The blue line denotes real GDP, while the orange line denotes the production index of mining and manufacturing.

Benchmark years are 1930 for both indices.

From 1944 to 1946, real GDP and production index declined 52% and 83%, respectively, and this implies that industrial production almost stopped in 1946.

To recover industrial production, a distinctive policy was designed and implemented, which is known as the priority production policy.

The idea of this policy is that the shortage of basic material was the bottleneck in production.

Hence, mitigating the bottleneck was essential.

To do that, the government had to concentrate resources in the coal mining and steel industries in the first stage.

Then, the recovery of coal and steel production would stimulate overall industrial production.

In addition, a new public financial institution, the Reconversion Finance Bank (RFB), was founded in 1947.

The priority production policy had both positive and negative aspects.

On the positive side, production of coal and steel, which were given priority, indeed increased.

This did have a positive spillover effect on some industries, including machinery.

On the other hand, the priority production policy had negative impacts as well.

Because of the concentration of resources in a few priority industries, allocation of resources to non-priority industry, including textiles, declined.

In addition, because of the abundant resource allocation and lack of market competition, firms in the priority industries tended to use resources inefficiently.

Finally, in the macro-economy, because of the increase in money supply, high inflation continued.

Section 5: Industrial policy for high economic growth

The fundamental reason for the negative aspects of the priority production policy is that the Japanese economy was still under the system of planning and control.

This condition changed in 1949.

From 1948, the U.S. government considered changing the occupation policy relating to Japan.

The basic reason was the start of the Cold War.

For the U.S. swift recovery of the Japanese economy was essential, to keep Japan in the Western or capitalist group of nations.

To reconstruct the Japanese economy, the U.S. occupation authorities implemented a set of four policies known as the Dodge Plan in 1949.

The four policies were: balancing the government budget, ceasing RFB loans, abolishing price and distribution controls, and unifying the exchange rate at 1 dollar=360 yen.

The Dodge Plan had a clear impact on the Japanese economy.

This figure shows the annual inflation rate.

Just after the war, hyperinflation higher than 450% per year occurred, and high inflation continued until early 1949.

However, when the Dodge plan was implemented, the inflation rate suddenly declined to a more normal level.

Implementation of the Dodge Plan implies that the Japanese economy returned to a market economy after around twelve years of experience being a controlled economy.

Responding to this basic change, a new ministry, namely the Ministry of International Trade and Industry (MITI) was established, by reorganizing the existing Ministry of Commerce and Industry.

One of the motivations for this change was the new emphasis on the importance of international trade.

In the document of 1949, MITI stressed such policies as promotion of exports, rationalization of the basic industries including electricity, coal, steel, and chemicals, abolition of economic controls and enhancement of efficiency.

Because the policy tools based on planning and control were outdated, the Japanese government introduced a new set of policy tools in the early 1950s.

The first was new public financial institutions, including the Japan Development Bank (JDB).

These public financial institutions were based on the funds from the Fiscal Investment and Loan Program, which in turn was based on funds from the postal savings system.

The second tool was special tax relief.

That is, a certain part of corporate tax was remitted if a firm acquired certain kinds of equipment for industrial rationalization.

Another new policy tool was the foreign exchange allocation system.

The foreign exchange allocation system can be summarized as follows.

Foreign exchange acquired by private firms through exports was concentrated by the government.

The government allocated this foreign exchange according to the foreign exchange budget decided every half year.

The foreign exchange budget was composed of the FA (Foreign exchange allocation) budget and the AA (Automatic approval) budget.

The AA budget was allocated in a lump sum to the group of goods classified as AA goods, while the FA budget was allocated to each of the goods classified as FA goods.

Furthermore, the FA budget was allocated to each firm by the government.

This system had important implications for industrial policy.

The foreign exchange allocation system was used as a powerful tool in industrial policy.

That is, the government used the foreign exchange allocation system for the protection of domestic industries from international competition, promotion of exports, promotion of investment and controlling competition among domestic firms.

Using these policy tools, the government implemented various industrial policies.

Let me talk about two cases, namely rationalization of the steel industry, and promotion of the automobile industry.

When the Japanese economy transited to a market economy, it faced a problem that industrial equipment was aging.

This figure illustrates the age distribution of rolling mills in the steel industry.

As of 1949, more than half of the rolling mills had been installed before the war.

Industrial rationalization policy aimed at replacing obsolete equipment by new equipment.

The government supported this with JDB loans and tax relief.

Consequently, the age distribution of equipment changed substantially in 1955 and in 1960.

Through the renewal of rolling mills, new technology adopted rapidly.

That is, the so-called strip mills that produce thin steel plate efficiently diffused throughout Japanese steel firms, which in turn became the basis of its international competitiveness.

The second case is the promotion of the automobile industry.

The automobile industry is currently Japan's major industry and has high international competitiveness.

However, in the 1950s, it was in an infant stage.

To protect the domestic automobile industry, the government utilized the foreign exchange allocation system.

That is, when the government decided to promote the domestic automobile industry, the government intentionally reduced foreign exchange allocations for car imports.

In addition, while protecting the industry from international competition, the government supported the industry through promotion of parts suppliers.

For this purpose such policy tools as JDB loans and tax relief were used.

It should be noted that the policy that the government designed was not always appropriate.

A well-known example is the case of the Draft Bill of the Temporary Law for Promoting Designated Industries.

This draft bill was proposed by MITI to consolidate passenger car firms to enhance the industry's international competitiveness.

Passenger car producers, the banks and other economic organizations objected to this draft, and as a result the Diet rejected the bill.

If this law had been implemented, the excess intervention of the government would have meant that the Japanese automobile industry would not have been as competitive as it is now.

This figure illustrates the development of the Japanese automobile industry and the role of industrial policy.

In 1954, the government reduced foreign exchange allocations for car imports, which had a clear impact. That is, car imports declined sharply.

In the early 1960s, Japan already exported substantial number of cars, which implies that

the Japanese automobile industry was already competitive in the international market.

After that the government liberalized car imports.

Liberalization of car imports was a part of the general liberalization of trade.

As I showed, the Japanese government operated a foreign exchange allocation system and utilized it to support industrial policy.

Meanwhile, the US government, the IMF and GATT requested the Japanese government to abolish the foreign exchange allocation system from the late 1950s.

Responding to this pressure, the Japanese government announced in 1960 that the proportion of AA budget would be raised from 40% to 80% in three years.

This figure shows the composition of the foreign exchange budget, and the gray line denotes the percentage of the AA budget.

The percentage of AA budget increased sharply in the early 1960s, and in 1963, the percentage of AA budget came near to 80%.

Section 6: Transition to a lower growth path

The Japanese economy that had maintained high growth from just after the war, including the period of economic recovery, faced two large external shocks in the early 1970s, namely the Nixon Shock in 1971 and the First Oil Crisis in 1973.

The Nixon Shock refers to the statement of the US President Richard Nixon to suspend the exchange of US dollar and gold at a fixed price, which was the core of the international currency system, called the Breton Woods Regime.

As a result, the exchange rate of the yen substantially appreciated, as indicated by the blue line in this figure, which had a negative impact on the Japanese economy, especially on the exporting industries.

Two years later, another external shock, namely the First Oil Crisis hit the world economy.

War between Israel and the Arab countries triggered sharp increases in world oil prices.

Through these external shocks two favorable conditions for the Japanese economy, that is, a low exchange rate for the yen and a low oil price, were lost.

This is reflected in the decline in the economic growth rate after this.

As the blue line in this figure indicates, the growth rate of real GDP declined substantially in the early 1970s.

At the same time, as indicated by the orange line, the hours of operation of industrial equipment declined, which means industrial firms came to have excess production capacity.

In particular, the industries producing basic materials intensively using energy were seriously damaged by the increase in the oil price and the decline in the growth rate, and the restructuring of those industries became an important issue for industrial policy.

To promote industrial adjustment, two temporary laws were made, namely, the Temporary Law for Stabilizing the Special Depressing Industries in 1978 and the Temporary Law for Structural Improvement of the Special Industries in 1983.

The basic scheme of these laws were that the government designated those industries that were in structural depression, and each designated industry drew up a plan for reducing its production capacity.

The government examined and approved each plan.

In the case where the government approved the plan, a cartel for disposing of excess capacity was exempted from the anti-monopoly regulation, and the government guaranteed the liability of the participating firms.

According to the two laws, 14 and 26 industries were designated, respectively.

In the 1980's, the Japanese economy emerged on a lower but stable growth path.

The new growth path was more dependent upon exports.

This is reflected in the increase in the percentage of the surplus of the balance of international payments, shown by the blue line in this figure.

One of the major export goods from Japan in this period was automobiles.

While Japan exported around 2.6 million cars in 1975, it exported around 7.2 million in 1985.

This surge of car exports caused a trade conflict between Japan and the United States, a major destination country.

Trade conflict between Japan and the U.S. dates back to the 1950s, when the increase in textile exports from Japan to the U.S. was an issue.

The characteristic of the trade conflict in the late 1970s and the 1980s was that it linked with the issue of imbalance in the current account of international payments at the macro-level.

In addition, the conflict was about the automobile industry, which was also a key industry of the U.S.

For these reasons the trade conflict in the late 1970s and 1980s was very serious.

Concerning the conflict about automobiles the governments of Japan and the U.S. and the automobile firms of the two countries were deeply involved in tough negotiations to mitigate the conflict.

As a result, basically two measures were taken.

First, major Japanese automobile firms, namely, Honda, Nissan and Toyota, established car plants in the United States, so that they could maintain employment in the U.S.

Second, through negotiations, Japanese automobile firms voluntarily restricted exports to the U.S. from 1981 to 1983.

Nominally this was voluntary, but the export ceiling was determined through negotiation between the government of Japan, the government of the US, and the automobile firms of the two countries.

Also, allocation of the ceiling to each firm was determined through negotiation between the Japanese government and firms, and it was enforced by the administrative guidance of the Ministry of International Trade and Industry.

Section 7: Conclusions

As we have seen, Japan caught up with Western countries in the period from the late nineteenth century to the late twentieth century.

From a broader perspective, we can regard Japan's catch up as a part of the "Great Convergence," that is the catch up of non-Western countries with Western countries, and Japan was the first runner in this process.

Industrialization with progressive updates of the industrial structure was the main engine of the development of the Japanese economy.

Industrialization was mainly by the private sector, but the government also played an essential role.

The government introduced modern institutions, established the education system for human capital formation and supported industrial development with the industrial policy.

This complementarity between the private sector and the government has been the key to the development of the Japanese economy since the late nineteenth century.