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Japan's Development as a Natural Resources Based "Big Push" Success Story

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Abstract

Japan caught up with the West twice - once in the 1920s and again in the 1970s after its post-war reconstruction. The latter – a state-coordinated “big push” that succeeded despite a paucity of natural resources – is a template for post-disaster policies in developed countries. But Japan's initial convergence, from 1885 to roughly 1920, was powered first by mining and then by public equity issues. Government failure in an SOE-led natural resources based “big push” wrought a fiscal crisis, a mass privatization, decades of laissez-faire. During those decades, coal and metals mines became cash cows for large rapidly diversifying pyramidal business groups; whose apex companies coordinated economy-wide industrialization efforts, succeeding where the state had failed. In the early 20th century, stock markets displaced mines as primary capital providers. This “high growth period” presages subsequent “big push” development prescriptions, but highlights the importance of private sector, rather than state, coordination.

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1. Natural Resources and Economic Growth¹

A “natural resources curse” appears to retard growth in countries with abundant oil, minerals, or other natural resources (Sachs and Warner, 1999, 2001; Auty, 2001). Despite a few dissenting studies (e.g. Davis, 1995), a large body of empirical work and many country case studies confirm the credence of this curse in resource-rich regions of Africa, the Middle East, Latin America, Russia, and South Asia (Humphries et al. 2007).

Since many of today’s wealthiest economies – Australia, Canada, Germany, Sweden, and the United States to name a few – industrialized by diversifying natural resources based economies, this curse is not inexorable. An obvious solution to this discrepancy is that initial institutional endowments immunized these economies Innis (1956). This is consistent with the resource curse damaging economic growth by fueling political rent seeking (Krueger, 1974). That is, a government fattened with natural resource revenues so elevates the return to political rent-seeking that other forms of investment offer uncompetitive returns. If investing in political connections pays far more than operating businesses, corruption flourishes and general economic conditions stagnate (Murphy et al. 1993).

The varying economic success of different East Asian economies is offered as further proof of the curse. Resource-poor Hong Kong, Singapore, South Korea, and Taiwan are now “developed economies, while resource-rich Burma, Indonesia, and Papua-New Guinea remain impoverished. Lacking natural resource rents, the argument goes, the business elite in each of the former set of economies had no option but to invest in high productivity economic activities that greatly expanded not only tycoons’ fortunes, but (even if entirely incidentally) also the government’s tax base and the middle class.

We show that Japan does not belong in this group. Postwar Japan lacked natural resource wealth because these were depleted in its first high growth era – the late 19th and early 20th century – which brought Japan alongside much of the West by 1920. That episode, the first successful industrialization of an Asian nation, was unambiguously the diversification of a natural resources based economy, and recalls the economic histories of Canada and Sweden. Japan’s post-WWII growth is the reconstruction of a pre-existing industrial economy, and probably should not properly be regarded as a case of economic development.

After centuries of cultural isolation, the Tokugawa Shogunate (1603 – 1868) grudgingly opened to the outside world under the cannon of Commander Perry’s American gunboats in 1854. The Samurai warriors who led the 1868 Meiji Restoration, a coup d’état to oust a regime that yielded to foreigners, sent students abroad to learn foreign ways – so that Japan might acquire sufficient military power to repel future foreign intimidators. The Meiji state’s first development program, launched in the 1870s, capitalized a large state-owned enterprise (SOE) in each modern industry deemed essential. Expecting these SOEs to lose money initially, the government dedicated revenues from SOE mining companies to subsidize them. This program closely presages the “big push” development programs prescribed by Rosenstein-Rodan (1943) and others.

Corruption and soft budget constraints quickly inflated the industrial SOEs’ losses far beyond the mines’ earnings, causing a dramatic government debt crisis and a bout of crippling inflation. To stem an economic collapse, liberal reformers organized the world’s first mass privatization, auctioned off most of the SOEs, and restored public finances. Once burned, Japan’s political leaders adopted a hands-off approach for the next decades – presaging the so-called Washington Consensus.

A mixture of venerable business families and foreign-trained entrepreneurs ultimately bought up these infant industrial ventures, forming the cores of *zaibatsu*, which would dominate the economy through subsequent decades of extraordinary growth. These largest of these pyramidal business groups

¹ This paper recapitulates and extends our previous thoughts on private-sector led big push growth in late 19th and early 20th century Japan (Morck and Nakamura, 2004). Parts of this paper reproduce discussions in that earlier study to clarify the basis underlying the additional arguments presented here.

each diversified into almost all sectors, transferred earnings from mining “cash cows” to infant industrial firms, just as the state had intended. We propose that the controlling shareholders of Japan’s great pyramidal business groups accomplished a “big push” growth surge that its government could not.

Huge pyramidal business groups are ubiquitous in developing economies – now (Khanna and Yafeh, 2007) and historically (Morck, 2005). We speculate that pyramidal business groups can substitute private-sector governance for state supervision in coordinating a natural resources financed “big push” growth surge. However, pyramidal groups can also entrench old moneyed rent-seeking oligarchs (Wolfenzon et al. 2005). We speculate that Japan’s business groups eschewed rent-seeking because the government’s post-crisis “hands off” policies made political influence a low-return investment.

2. Natural Resources and Economic Development

2.1 Blessing or curse?

The *staples thesis*, a longstanding theme in economic history, argues that natural resource booms can fuel economic development (Innis, 1923, 1930, 1940, 1956). This thesis holds that resource revenues let governments finance public education and infrastructure, and businesses undertake large-scale capital spending. Long an orthodox model of Canadian economic history (e.g. Easterbrook and Watkins, 1984), it records a sequence of resource-based industries – fishing, the fur trade, agriculture, timber, mining, and fossil fuels – propelling the economy forward; and stresses how natural resources exports reinforced cultural ties to Britain and its institutions.

In contrast, orthodox economic history in Latin American portrays natural resources locking in poverty. Explanations range from resource wealth inviting exploitation by foreign multinationals (Prebisch, 1960?) to inherently weak vertical linkages preventing natural resource booms from energizing other sectors (Hirschman, 1958).

Empirical evidence suggests that natural resource wealth is more often a curse in today’s developing economies. Resource wealth correlates negatively with economic growth, even after controlling for a range of other factors that might mask a positive correlation (Auty, 1990; Sachs and Warner, 1999, 2001). Case study evidence links natural resource wealth to elevated probabilities of civil wars (Ross 2003).

Empirical evidence further implicates the economics of political rent-seeking in this unfortunate regularity (Haber, 2002). Politicians and tycoons can live well by controlling or manipulating the state so as to appropriate natural resources revenues. Politicians have no need for a broad middle class to tax, and tycoons have no need for a broad middle class of skilled workers and avid consumers. In fact, both might see a broadening middle class as a threat to their continued diversion of resources rents. This is consistent with the successful industrialization of resource-based economies occurring primarily where legal institutions or historical circumstances restrain political rent-seeking.

2.2 Natural resources and the “big push”?

Rosenstein-Rodan (1943) argues that this generations-long process of economic development can be accelerated if the government gives the economy a “big push”. This is because an intractable set of coordination problems block rapid “catch-up” growth unless the state takes charge.

First, no single business can pay for universal education without courting bankruptcy, for other businesses would get a free ride by hiring graduates. The state must provide physical infrastructure, education, and other public goods to overcome such coordination failures.

Second, businesses in developed economies depend on far-reaching networks of suppliers, and those firms depend on yet more suppliers and their suppliers. A modern business cannot stand in isolation. Economic development requires the carefully coordinated capitalization of whole such

networks, with each firm coming on-line and expanding to match rising demand for its products by others in the network. These interdependencies are further complicated by complementarities across different sets of products. For example, a steel mill has few customers in construction unless concrete is also readily available. Concrete is not an input in steel-making, but without it, steel mills are hobbled nonetheless. Rosenstein-Rodan (1943, p. XX) argues that “No private sector mechanism exists that can simultaneously plan the industrialisation of several complementary industries”. State financing is therefore essential; as is central coordination of the capitalization and expansion of firms in different industries. This, he argues, necessitates either direct state ownership or careful state supervision of private sector firms.

Third, firms in different industries have different economies of scale, and these cannot always match perfectly in an industrializing economy. Foreign trade can mitigate this, but not fully; for transportation costs can be nontrivial. Essential suppliers must therefore be subsidized to operate at inefficient scales. Rosenstein-Rodan sees stepping up with the appropriate subsidy to the appropriate firm at the appropriate time.

Fourth, economic growth in an economy of private-sector firms can be blocked by “hold-up” problems. For example, a contemplated steel mill and a contemplated machinery plant might each have positive economic profits if the other existed. But if the steel maker built first, the machinery maker can extort rents by threatening not to build; and if the machinery maker built first, the steel maker could do the same. Vertical integration can solve this problem if only two firms are involved, but Rosenstein-Rodan argues that such coordination problems affect networks spanning the whole economy. He therefore argues for economy-wide integration via common state-control, or at least state guidance of private firms.

To fulfill all these duties, the state requires a reliable source of revenues prior to industrialization. Rosenstein-Rodan saw foreign aid as essential, but natural resources royalties are an obvious alternative. In fact, the “staples theory” of (Innis, 1923, 1930, 1940, 1956) repeatedly comes tantalizingly close to this argument, placing a series of natural resources financed development surges, each constraining and diverting development due to various market failure constraints. Sachs and Warner (2001) make the connection explicit: state revenue from natural resource extraction should be able to finance a “big push” and develop a country more rapidly. Given this, the development failure of resource-rich countries in Africa, Asia, and Latin America is especially troubling.

3. Japan’s Natural Resource Wealth

By the late 16th century, Japan’s feudal lords were operating highly productive gold, silver, copper and sulfur mines. Hideyoshi Toyotomi (1536-1598) organized the first comprehensive inventory of the country’s mineral wealth, having declared that all output from these mines belonged to the central government. The Shogunate directly controlled all major mines, but delegated the management of others to feudal lords via revenue sharing incentive schemes. This practice became Japan’s mining policy, and continued until the Meiji era.

The first Tokugawa Shogun, Iyeyasu (1543 – 1616), brought in fifty Spanish mining engineers to find more ore deposits, and imported foreign mining technologies to enhance the productivity of his existing mines. This led to the opening of copper mines at Ashio (1610), Okosawa (1666), and perhaps most importantly, the Besshi copper mines (1690), whose management the Shogun entrusted to the Sumitomo family from 1691 on.

Thus, Japan’s copper mines grew from 23 in 1668 to 50 in 1684-1687, and produced 1,250 tons of unrefined copper per year in the latter period. The Ashio mines yielded an average of 812 tons per year from 1610 through 1759, and the Sumitomo’s Besshi copper mine averaged about 558 tons of copper per year from 1691 through 1867 (Japan Oil, Gas and Metals National Corporation, 2006).

Table 1 clarifies the economic significance of these magnitudes by contrasting the total copper output of Japan in different periods with those of England and Chile, major contemporaneous producers. Complete historical data are unavailable, but Table 2 presents a decade-by-decade comparison with copper output from Sweden, yet another major producer of this era.

Table 1. Output from major copper producing countries, 1621-1800

| <u>Japan</u> | | <u>Chile</u> | | <u>England</u> | |
|--------------|-------------|--------------|-------------|----------------|-------------|
| period | tons per yr | period | tons per yr | period | tons per yr |
| 1621-1715 | 2,500 | 1671-1700 | 75 | | |
| | | 1701-1720 | 100 | | |
| 1716-1754 | 2,240 | 1721-1740 | 250 | 1726-1754 | 927 |
| | | 1741-1760 | 300 | | |
| 1755-1839 | 1,920 | 1761-1800 | 1,000 | 1755-1800 | 3,481 |

Source: Japan Oil, Gas and Metals National Corporation, History of Copper Business, Tokyo, 2006.

Table 2. Copper production and exports by Japan and Sweden, 1701 to 1800.

Exports are actual exported amounts, not amounts contracted for. The latter are thought to have fallen short of the former towards the 1800s as the Tokugawa regime diverted copper to domestic use.

| | <u>Japan</u> | | | <u>Sweden</u> | |
|-----------|-------------------|-----------------------------|--------------------------|-------------------|----------------|
| | <u>Production</u> | <u>Exports</u> | | <u>Production</u> | <u>Exports</u> |
| | | <u>Dutch East India Co.</u> | <u>Chinese merchants</u> | | |
| 1701-10 | 5,340 | 912 | 2,930 | unknown | unknown |
| 1711-20 | 3,840 | 609 | 1,904 | unknown | unknown |
| 1721-30 | unknown | 597 | unknown | 830 | 334 |
| 1731-40 | unknown | 541 | unknown | 793 | 309 |
| 1741-50 | unknown | 594 | unknown | 863 | 191 |
| 1751-60 | unknown | 660 | 1,154 | 839 | 324 |
| 1761-70 | 2,873 | 554 | 1,047 | 715 | 303 |
| 1771-80 | 2,702 | 559 | 897 | 892 | 516 |
| 1781-90 | unknown | 454 | 962 | 1,153 | 616 |
| 1791-1800 | unknown | 217 | 578 | 890 | 422 |

Source: Shimada (2006, Table 1, p.55).

Both the Ashio and Beshi mines peaked near the beginning of the 18th century, and their output was slowly declining until the Meiji era – primarily because flooding prevented the miners from following veins deeper. The third Tokugawa Shogun, Iyemitsu Tokugawa (1604-1651), proscribed contact with foreigners in 1639. This ban lasted for two centuries until Admiral Perry's arrival; but excepted the copper exports to the Netherlands and China described in Table 2. Copper exports to Holland passed through Dejima Island, a hermetic Dutch enclave on in Nagasaki harbor, and Japanese copper was a major part of the Dutch East Indies Co. (VOC) Asia trade.² Japan's copper exports to China went through approved Chinese merchants.

² VOC stands for *Vereenigde Oost-Indische Compagnie*; lit. *United East Indian Company*. One of the modern world's first joint stock companies, the VOC was established in 1602 to import spices from the East Indies (Indonesia). The company rapidly grew to trade in a wide range of commodities, and was, for a time, a major force in global political and economic events.

By the late 17th and early 18th centuries, Japan's gold and silver mines deteriorated to the point where the country began importing first silver and then gold from China, and then the VOC. Thus, from 1769 to 1800, Dutch silver coins worth about ff1M entered Japan; while the Dutch bought Japanese copper worth about ff8M. This prices copper, in silver, at about 50% of the price prevailing in London at the time.³ The silver (and gold) trade with China is thought to have been substantially greater. Overall, it is estimated that about 25% of Japanese copper exports paid for silver and gold imports during this period.

Foreign interest in ending Japan's isolation was justified by the Japanese policy of instantly executing shipwrecked sailors who washed up on its coasts; but rumors the country's mineral wealth no doubt played a role too. From the late 18th century on, Western ships began appearing in the seas around Japan, perhaps offering illegal trade in precious metals at prices better than the Dutch and Chinese offered despite the death penalty in effect for such crimes (CITE?). The Japanese also maintained a 1:5 exchange ratio between gold and silver, while the world price was 1:15. These textbook arbitrage opportunities offered almost limitless profits to anyone daring enough to smuggle large quantities of copper, silver, or gold into and out of Japan.

The treaty Commander Perry extracted opened the ports of Shimoda, Yokohama and Hakodate to American trade in 1854. Foreign traders could now legally arbitrage the difference in precious metals prices between Japan and the outside world, and a massive outflow of gold ensued, amid much confusion about markets and mining operations for these metals.

Reconnection with the outside world let the Japanese adopt new pumping technology that helped the mines' output rebounded to new highs. The Tokugawa government asked Townsend Harris, the first U.S. Consul General to Japan, to send U.S. geologists to modernize Japan's mines. Two U.S. geologists, Raphael Pumpelly⁴ and William Blake⁵ arrived in Hakodate, in Hokaido, in February 1862; and spent the next year assessing Japan's mineral resources, including its coal deposits.

Pumpelly and Blake, while in Japan, trained a cadre of students in mining engineering and natural sciences. For example, they demonstrated how to use gunpowder to rejuvenate the Yurappu lead mine, which produced lead for gun bullets and continued operating until 1970. Their students subsequently became major players in Japanese mining (Murakami, 2007). Consequently, their influence persisted for years.

Pempelly proposed three major technological innovations to reverse the long-term downward trend in mining output: explosives to expand mines, steam-powered pumps to keep deep passages from flooding,, and the Western design of using vertical shafts to link sloped horizontal passages. This interdependence highlighted how heavily modern mining industry relied on other sectors – like industrial machinery, electrical equipment, and shipping and transportation. After the Meiji restoration, these reforms were implemented, and Japan's mining industry resurged to new heights.

4. A Failed “Classic” Natural Resources Based Big Push

The samurai at the head of the Meiji Restoration seized power to purify Japan of foreign influence. Once in power, they understood that this goal would require an intermediate step. To defeat the Western powers, Japan would have to replicate their military technology. And to do this, Japan would need a modern industrial economy.⁶

³ Shimada (2006) argues that this disadvantageous price persisted because the Japanese limited contact with foreigners, and so locked in monopsony pricing.

⁴ Raphael Pumpelly (1837—1923) was a Harvard professor and President of the Geological Society of America.

⁵ William Phipps Blake (1826-1910) received a Ph.D. from Yale's Sheffield Scientific School in 1852.

⁶ This section draws heavily on Morck and Nakamura (2005), who provide more detail on these events.

The Meiji leaders thus paid for young Japanese to go abroad and study foreign science, law, economics, and engineering; and to observe foreign courts, economies, and governments actually worked. The reports these emissaries returned with alarmed the *Meiji* samurai, and they resolved that Japan would have to change. What followed was institutional change unparalleled in scope and depth until the *shock therapy* post-socialist reconstructions in 1990s Eastern Europe. The expression *shock therapy*, coined in that context by Sachs (1990), seems perhaps more apt here.

Meiji Japan's shock therapy, like its 1990s namesakes, was a comprehensive and simultaneous reform of all institutions. Within a few years, Japan had a democratic legislature modeled on the German Diet, public schools modeled on those of France and Germany, universities modeled on those of Germany, and Prussian-inspired army, and a British-inspired navy; all while it enshrined religious freedom, legitimized social mobility, and broke up feudal estates in a comprehensive land reform.

Remarkably, the Meiji reformers, all samurai, concluded that hereditary casts and a warrior ethos were hopelessly at odds with modernization; and ended all feudal ranks and privileges in 1871. Japan's feudal system had united its society, so a new binding agent was needed. Using the German Civil Code as a template, with modifications and with grafts from other legal models, Japan erected a new state-of-the-art late 19th century legal system. By the early 1870s, regulations governed public bond issues, and the 1878 Stock Exchange Ordinance allowed modern stock markets to rise in Tokyo and Osaka. By 1888 Japan's Civil Code was easily as sophisticated as its German archetype.

4.1 A "Classic" Big Push

The government's goal was still industrial munitions plants, naval shipyards, and the like. Two great Tokugawa era merchant houses, the Mitsui and Sumitomo, adopted foreign technology for their traditional businesses, like silk or copper; but did not diversify significantly. Their new banking and trading units were supportive of their traditional business. This may have reflected a conservative cultural bias. But a precautionary pause in a rapidly changing environment was also a sound strategy in retrospect. Other equally great merchant houses, the Shimomura and Ohmura, were floundering and ultimately faded away. The Mitsui and Sumitomo lacked sufficient capital and expertise to tinker with unknown foreign machines without courting disaster.

The State therefore took the lead, and established SOEs to import and apply foreign technology to modernize the military. The last Tokugawa Shogun had started down this path, and the Meiji leaders inherited a set of armaments and munitions SEOs, which they placed under direct military control. The Yokosuka ironworks, Yokohama ironworks, Uraga shipbuilding, and Ishikawajima shipbuilding went to the navy; and Sekiguchi manufacturing went to the army. Prominent Tokugawa era lords, anxious to modernize their military capabilities, had also established munitions operations. The Meiji rulers expropriated these, delivering the Shikine gun powder plant and Shuseikan manufacturing complex to the navy and the Takinokami gun powder plant and Ogi Chuzou metal casting plant to the army.

These needed inputs, so a second rank was established. Railroads, merchant shipping, and other infrastructure builders also became essential, requiring yet more SOEs. The Meiji government clearly understood it needed a *big push*, for it rapidly established state-owned enterprises in every modern industry. Ultimately, the most important SOEs of the early Meiji era were established by the Meiji government itself. These were large and costly ventures in modernized coal mining, machinery, chemicals, and textiles. In machinery and chemicals, the Meiji government established Akabane seisakusho, Cement seizosho, Shingawa glass seizosho, and Shirorengaishi seizousho. In cotton, textiles, and clothing, key state-established ventures included Tomioka seishisho, Shinmachi Bousekisho, Senju seijusho, Aichi bousekisho, and Hiroshima bousekisho.

The Ministry of Industry set up SOEs in mining, railways, civil engineering, telegraphy, navigation, shipbuilding, iron production, and manufacturing (Morck and Nakamura, 2004). It led a development master plan for the whole island of Hokkaido, with SEO cotton mills, breweries, dairy

products plants, canneries, sugar refineries and other ventures. Hyogo shipbuilding, seized from a Tokugawa lord, also went to the Ministry of Industry.

The Ministry of the Interior was charged with control over general commerce, vital statistics, the post office, cartography, land surveys, and the police; and given a budget for civil engineering projects. Railroad SOEs were quickly set up for moving goods, but the Meiji leadership also saw how they could connect previously isolated regions into a national economy, and ordered additional lines between remote interior regions and open ports. Ordered to make the country as self-sufficient as possible, the Interior Ministry set up SOEs related to agriculture, forestry, textiles, pulp and paper, maritime shipping, and other sectors. Its control over policing and regional matters involved the ministry in local affairs, and in numerous small-scale SOEs throughout the country: experimental agricultural stations, farm factories, and dairy farms – many on very small local scales. But it also set up large-scale SOEs in agriculture, dairy products, and food mass production.

The Ministry of Agriculture also established larger SOEs in industries connected with food supplies (Kobayashi (1977, Ch.4); and the Sakai textiles plant, seized from a Tokugawa lord, went to the Ministry of Finance.

The government clearly appreciated that many, perhaps most of these SOEs would lose money for many years. To keep them afloat, the government decided to enter the mining business. Japan's first mining law, passed in 1873, made all underground minerals state property – effectively expropriating the many mines owned by Tokugawa warlords. To these were added a large number of new SEO mines, many built around discoveries by Pumpelly and Blake, and their students.

Japan's only modern Tokugawa era coal mine, the Takashima mine near Nagasaki, was owned by the Dutch merchant T.B. Glover, albeit with Japanese partners.⁷ MacMaster (1963, p. 17) holds rightly that "The influence of Takashima as a successful pilot model [for] ... other Japanese mining projects is inestimable." But, foreigners running the mine embarrassed the Meiji rulers, and likely motivated the 1873 mining law. Threatening outright expropriation, the government bought the Takashima mine for \$400,000 in 1874. At the time, this seemed generous, and the reformers were denounced for currying foreign favor. It was at this point that the politically-connected merchant, Shojiro Goto, began his ill-fated stewardship of the mine.

The Ministry of Industry ran ten large SEO mines, and contracted the management of the rest, often to political cronies like Goto. All revenues generated by the directly-run mines accrued to the state, and royalty sharing agreements governed the others. Table 3 shows the split in output between state-run mines and privately-managed SOE mines.

Table 3. Fraction of output from state-run mines, as opposed to state-owned mines run by private managers, during the Meiji era's "classic" big push.

| | gold | silver | copper | iron | coal |
|------|------|--------|--------|------|------|
| 1874 | 37.4 | 51.8 | 0.7 | 0.0 | 64.4 |
| 1875 | 71.8 | 43.1 | 5.2 | 0.0 | 17.4 |
| 1876 | 76.5 | 58.8 | 9.9 | 0.0 | 14.5 |
| 1877 | 73.1 | 60.2 | 5.7 | 0.0 | 13.0 |
| 1878 | 97.0 | 68.2 | 5.0 | 0.0 | 12.2 |
| 1879 | 74.4 | 59.1 | 7.5 | 0.0 | 14.1 |
| 1880 | 62.5 | 51.9 | 6.1 | 19.4 | 18.1 |
| 1881 | 62.8 | 40.3 | 5.5 | 26.7 | 19.0 |
| 1882 | 63.7 | 50.3 | 5.2 | 33.0 | 19.1 |
| 1883 | 51.9 | 46.8 | 7.4 | 21.2 | 17.4 |
| 1884 | 50.8 | 40.0 | 3.9 | 42.2 | 19.1 |

⁷ In 1888, Mitsui began modernizing the huge Miike coal mine located in Northern Kyushu.

| | | | | | |
|------|------|------|-----|------|------|
| 1885 | 47.4 | 19.3 | 0.1 | 58.5 | 18.7 |
| 1886 | 32.7 | 15.4 | 0.1 | 25.6 | 20.4 |
| 1887 | 38.5 | 16.9 | 0.1 | 23.9 | 21.1 |

Source:

These policies are recognizably analogous to the Rosenstein-Rodan's (1943) "big push". The government's plan to expand mining output to pay for rapid economy-wide industrialization is precisely the sort of coordinate growth described by Murphy et al. (1989). The Interior Ministry's charge, to make the country as self sufficient as possible, even evokes the import substitution development agendas of the 1950s and 1960s (Prebisch, 1960). It appears mid-twentieth century development economics recapitulates the policies of 19th century Meiji Japan remarkably faithfully.

4.2 Government Failure

In retrospect, the reformers were unduly optimistic. The SOEs soon ran up losses far beyond their worst expectations, and the state's mining revenues fell far short of the challenge. The SEO mines whose management was contracted out were especially disappointing, never providing more than 0.1% of the state's revenues.

The reformers hoped mining revenues would ultimately pay for industrialization, but could not wait for the country's existing mines to expand and for new ones to come on line. To raise money immediately, they undertook a comprehensive tax reform in 1873, abolishing the peasants' age-old rice tax to their feudal lords and requiring taxes to be paid in coin and directly to the central government's tax collectors. This revenue, plus earnings from the expanding mining sector, kept the government's operating budget balanced through 1875.

But the rapidly expanding industrial SOEs, virtually without exception, ran up rapidly deepening losses. It seems likely this was because individual SEOs lacked budgets. Rather, each ministry had a mission, a budget, and full responsibility for all its SEOs' losses. This was not merely a "soft budget constraint", of the sort reformers in 1990s Eastern Europe sought to harden. Individual SOEs quite literally had no budget constraints at all, for all their losses were entirely collective. Each SOE top manager thus confronted a classic free-rider problem, and a strong incentive to run up losses faster than other SEOs under the same ministry.

To contend with existing SOE losses and launch yet more new ones, the Meiji reformers began issuing bonds. The first issue, £1 million at 9% raised in London in 1870, financed SOE railways.⁸ A second London issue in 1873 raised a £2.4 million more, this time at only at 7%, to pay former feudal lords and samurai their allowances – one third to one half of the state's overall budget. The government then ended these allowances, giving their recipients yet other government bonds 1876, freeing up funds from the second London issue to underwrite more SOEs.

Government debt was nothing new in Japan, for the shoguns traditionally extracted loans from wealthy merchants. These were always secret, so noble samurai would not be seen dealing with socially despicable merchants. The Meiji reformers were now borrowing openly from foreign merchants, so formal debts to domestic merchants no longer seemed beyond the pale. From 1872 through 1883, a series of debt issues to domestic investors raised ¥292 million – about seven times the state's total annual budget in a typical year.

In 1877, the reformers needed even more money to put down a rebellion by disgruntled traditionalists. They had created a long sequence of numbered national banks empowered to print inconvertible bank notes, and borrowed another ¥15 million from the 15th of these. Still short and

⁸ At this time, the yen was at parity with the American dollar, and one pound was ¥4.85.

desperate to end the uprising, the government printed ¥27 million in inconvertible paper currency, mobilized a larger military force and put down the rebellion.

But the state and the numbered banks were now all printing fiat paper. The first four national banks, established in 1873, were empowered to issue paper money fully backed by gold. Their inability to guarantee convertibility, plus the state's need to print money, led to the relaxation and abandonment of convertibility into gold. This reform, along with relaxed entry collective action problem ensued – each bank profited by printing money faster than the others, and inflation accelerated rapidly. High inflation was unpopular, and the government's foreign debts were now becoming unmanageable.

4.3 Liberalization

The Meiji Finance Minister, Masayoshi Matsukata, resolved to conquer inflation and restore fiscal balance. To this end, he launched a set of reforms in the early 1880s that remarkably presaged the liberalizations of the late 20th century.

Matsukata's monetary reform unified the currency. The numbered national banks and the state would no longer issue paper money; only the Bank of Japan would do this; and its yen would be backed by silver from 1886 until 1897, and thenceforth by gold. This rebuilt trust in the yen and brought seniorage fully into the government's revenue stream. Inflation fell sharply, and prices actually fell annually from 1881 through 1884.

But lasting reform would require stopping the SOE money sink. This required a fundamental change in the government's basic development philosophy – a forsaking of state-led development and an embrace of 19th century liberalism.

From 1878 on, each SOE had to provide a budget, and balance sheet in accordance with state-of-the-art accounting principles. This "corporatized" the SOEs, delineating which assets belonged to which and immersing the SOE managers in the economics of their enterprises. Corporatization isolated losses in the SOEs that ran them up, ending the free rider problems of the previous system of ministry-level accounting. It also clarified which SOEs were the worst loss generators, and so undercut their lobbying power.

Matsukata cut subsidies slowly at first, and lobbying protected maritime shipping, railways, and silk from any cuts at all. But, as fiscal reality sunk in, the Meiji reformers accepted universal and deeper cuts, and finally a total moratorium on new SOEs. The deep subsidy cuts inflicted hard budget constraints on the SOEs for the first time; and, as in the transition economies of Eastern Europe and the former Soviet Union (Shleifer and Vishny, 1994), SOE governance improved abruptly.

Table 4. Major SOEs privatized in the late 19th Century

Takashima was privatized in response to political criticism of its nationalization, and served as a template for the mass privatization of the 1880s and 1890s. Book values are as of Dec 1885 and assessed value is estimated as of June 1885.

| Sold | SOE | Book | Assessed | Sale Price | Initial Buyer | Resold | Ultimate status |
|-------|--------------------------------------|----------------|--------------|------------------|-------------------------------------|--------------------------------------|----------------------------------|
| 11/74 | Takashima Coal Mine | ¥393,848 | – | ¥550,000 | Shojiro Goto | Mitsubishi, 1881 | Mitsubishi Materials closed 1986 |
| 6/82 | Hiroshima Cotton Spinning | 54,205 | – | 12,570 | Hiroshima Menshi Boseki Co | Kaizuka Boseki, 1902 | |
| 1/83 | Aburato Coal Mine | 48,608 | 17,192 | 27,943 | Nariteru Shirase | Mitsubishi, 1896 | Mitsubishi Materials closed 1986 |
| 7/84 | Nakakosaka Iron Ore | 85,507 | 24,300 | 28,575 | Yahachi Sakamoto & al. | | Closed |
| 7/84 | Cement Mfg & Fukagawa Shirorengaishi | 101,559 (comb) | 67965 (comb) | 61,741 12,121 | Soichiro Asano Katsuzo Nichimura | Nihon Cement Shinagawa Shirorenga | Closed Taiheiyo Cement |

| | | | | | | | |
|-------|---------------------------------|-----------|---------|-----------|------------------------------------|--------------------------------|---------------------------------------|
| 10/84 | Nashimotomura Shirorengaishi | – | – | 101 | Raizo Inaba | – | – |
| 8/84 | Kosaka Silver Mine | 547,476 | 192,000 | 273,659 | Shosaburo Kuhara | – | Dowa Kogyo |
| 12/84 | Innai Silver Mine | 703,093 | 72,993 | 108,977 | Ichibei Furukawa | Furukawa Kogyo | Furukawa Kogyo, closed 1953 |
| 3/85 | Ani Copper Mine | 1,673,211 | 240,772 | 337,766 | Ichibei Furukawa | Furukawa Kogyo | Ani Kozan, 1973 |
| 5/85 | Shinagawa Glass | 294,168 | 66,305 | 79,950 | Katsuzo Nishimura, Eiichi Isobe | – | Closed, 1892 |
| 6/85 | Daikatsu Makiyama Gold Mine | 149,546 | 98,902 | 117,142 | Sen Abe | Mitsubishi, 1888 | Okosawa Kozan, 1972 |
| 11/86 | Aichi Cotton Spinning | ¥58,000 | ? | ? | Naoto Shinoda | – | Burned down, '96 |
| 12/86 | Sapporo Brewery | ? | ? | 27,672 | Kihachiro Okura | Sapporo Beer, 1887 | Sapporo Beer |
| 5/87 | Shinmachi Textile (Silk) | 138,984 | ? | 141,000 | Mitsui | Yasushi Asaba, Kanebo, 1911 | Kanebo Co. |
| 6/87 | Nagasaki Shipbuilding | 1,130,949 | 459,000 | 459,000 | Mitsubishi | Mitsubishi Heavy Ind. | Mitsubishi Heavy Ind. |
| 7/87 | Hyogo Shipbuilding | 816,139 | 320,196 | 188,029 | Shozo Kawasaki | Kawasaki Heavy Ind. | Kawasaki Heavy Ind. |
| 12/87 | Kamaishi Iron Ore | 2,376,625 | 733,122 | 12,600 | Chobei Tanaka | Kamaishi Kozan, 1924 | Nippon Steel |
| 1/88 | Mita Ag. Tools Mfg. | ? | ? | 33,795 | Shun Koyasu | Tokyo Kikai Mfg. | Tokyo Kikai Mfg. |
| 3/88 | Banshu Vineyard | 8,000 | ? | 5,477 | Shomei Maeda | | |
| 8/88 | Miike Coal Mine | 757,060 | 448,549 | 4,590,439 | Hachiro Sasaki | Mitsui, 1889 | Mitsui Coal, closed 1997 |
| 11/89 | Hornai Coal Mine & RR | 2,291,500 | | 352,318 | Hokkaido Tanko Tetsudo | Mitsui, 1889 | Hokkaido Tanko Kisen, closed, 1989 |
| 3/90 | Monbetsu Sugar Beets | 258,492[| | 994 | Kuninari Date | Sapporo Seito, 1895 | Closed, 1896 |
| 9/93 | Tomioka Textiles (Silk) | 310,000 | 105,000 | 121,460 | Mitsui | Katakura Kogyo, 1939 | Closed, 1987 |
| 9/96 | Sado Gold Mine | 1,419,244 | 445,250 | 1,600,000 | Mitsubishi | Mitsubishi Materials | Closed, 1973 |

4.4 Mass Privatization

Modern balance sheets also put a book value to each SOE, and these were huge. Struggling to cope with declining budgets for basic government services, politicians began thinking about recovering these amounts by selling some, or even all, SOEs to private investors.

Talk of privatization evoked counterarguments that the SOEs were never intended to be individually profitable: full-scale modernization was thought worth individual firms' losses, as in Rosenstein-Rodan (1943), Murphy et al. (1989), and Sachs (2006). But profits from some SOEs, especially the mines, were expected to pay for the losses of others. Across-the-board and seemingly unending losses were never in the cards. But even within this debate, SOE supporters had to justify benefits against a more realistic assessment of costs, including the opportunity costs recoverable via privatizations.

These arguments failed to win the day, and the Meiji government set about planning a mass privatization. Its first program, in 1880, offered fourteen large money losing SOEs for sale at their gross book values (book value with no allowance for depreciation). State officials were to screen prospective buyers, not for ability or expertise, but for sufficient financial resources to guarantee continued

operations (reallocating SEO assets was not to be avoided). Virtually no buyers showed, and the privatization plan stalled.

Struggling under mounting fiscal pressure, the officials who had established the country's SEOs reluctantly concluded that most were not worth their gross book values. The government therefore passed a second mass privatization law in 1884, aimed primarily at raising money. This offered profitable SOEs, including mining operations, to the highest bidder.

The Takashima mine, nationalized in 1874, was the model for this program. Smarting from criticism for overpaying the mine's foreign owners when nationalizing it, the government resold it a year later to the Meiji political entrepreneur Shojiro Goto for ¥550,000. This netted the government a ¥190,000 profit over what it paid the mines foreign owners.

The 1884 privatization program began Japan's fiscal deliverance by repeating this exercise with other profitable SEO mines. Successful mine sales invited more privatizations to raise further funds, this time of industrial SOEs. By 1896, 26 major SOEs had been privatized – in coal, mining, textiles, shipbuilding, cement, iron works, sugar refining, and glass making.

Table 4 details the largest privatizations, as well as their terms and buyers, and the final dispositions of the SOEs' assets. The buyers included Japan's traditional merchant houses, such as the Mitsui, who now expanded from the silk trade into mining and industry; and upstart Meiji era entrepreneurs like the Iwasaki, who built Mitsubishi, and Aikawa, who founded Nissan.

Some SOEs were exempted. Key military suppliers, money printers, government documents printers, railways, and telegraph lines remains state-owned, as did all post offices. Japan's major private railways and military equipment manufacturers arose subsequently, as brand new firms; none were former SOEs. Military suppliers judged obsolete or unimportant, however, were privatized, as were all other SOEs.

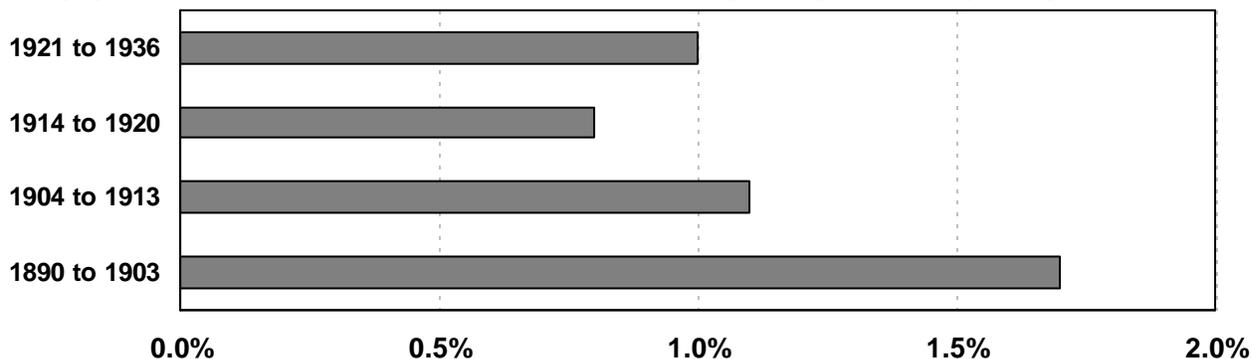
5. A "Low Fat" Natural Resources Based Big Push

The reformers' failed natural resources backed big push growth program had brought the economy to its knees. Japanese remained largely poor, and the military was still no match for foreign gunboats. Thus burned, the government adopted a "hands off" policy towards business that would last for decades.

From the mass privatization through the beginning of World War II, Japan established only one more SOE was established, Yawata Steel in 1901. Business subsidies, graphed in Figure 1, also remained tiny until the military takeover of the mid 1930s, when the army and naval officers took control of the government and established a corporatist economy under military control.

Figure 1. Business Subsidies, 1890 to 1936

Average government subventions to business as fractions of average total government spending



Miyajima (2004).

From the mid-1880s through to the 1920s, Japan was a good approximation to a classic *laissez-faire* economy. Legal reforms laid down the rules, and businesses maximized shareholder value. The stock market grew rapidly, first augmenting, and then displacing, mines as a source of funds for rapidly diversifying business groups. Banks, linked to corporate governance after World War II (Kaplan and Minton, 1994), played no such role during these liberal decades.

These decades were Japan's "high growth period". In the 1880s, Japan was poor and backwards. By 1920, it boasted an industrial economy on par with that of Canada or Italy, and had defeated the Russian Empire in one war and China in another, taking Korea, Manchuria, and Taiwan as colonies.

This section describes how Japan's economy undertook a successful big push during these decades, and did so with little or no government supervision. Japan's example shows that Rosenstein-Rodan (1943) erred in arguing that government coordination of "big push" industrialization was essential. In fact, Japan developed private-sector institutions fully capable of mobilizing the economy's natural resources wealth and coordinating "big push" growth across all sectors of the economy, just as they other high growth economies of this era did – including Canada and the United States.

Rosenstein-Rodan, like Japan's Meiji reformers, saw state-leadership as essential because a modern munitions plant cannot prosper in isolation. First, the state must provide public goods, like an educated workforce and a transportation infrastructure, without which it cannot operate. Second, such a plant depends on a far-reaching network of suppliers, and those depend on yet more suppliers and their suppliers. Complementarities across different sets of products add yet more interdependencies.

Rosenstein-Rodan (1943, p. XX) argues that "No private sector mechanism exists that can simultaneously plan the industrialisation of several complementary industries", yet this is precisely what is needed to establish whole networks of firms at once, ergo the state is essential. Third, the state must subsidize firms forced to operate at inefficient scales until other sectors, to which they are essential, expand. Fourth, pervasive state control is necessary to prevent "hold-up" problems.

We agree with Rosenstein-Rodan's diagnosis. These market failures are indeed economically important. But we disagree with his diagnosis. Japan's subsequent economic history shows that private sector mechanisms do exist to "simultaneously plan the industrialisation of several complementary industries". Moreover, these mechanisms brought Japan fully into convergence with the West within a few decades, and avoided the government failure problems that came to a head in the 1880s.

To explain this mechanism, we consider how Japanese businesses were governed during this high growth period. We do this by charting the expansion of key businesses in 1880s Japan, and then generalizing from these cases.

5.1 Mitsui

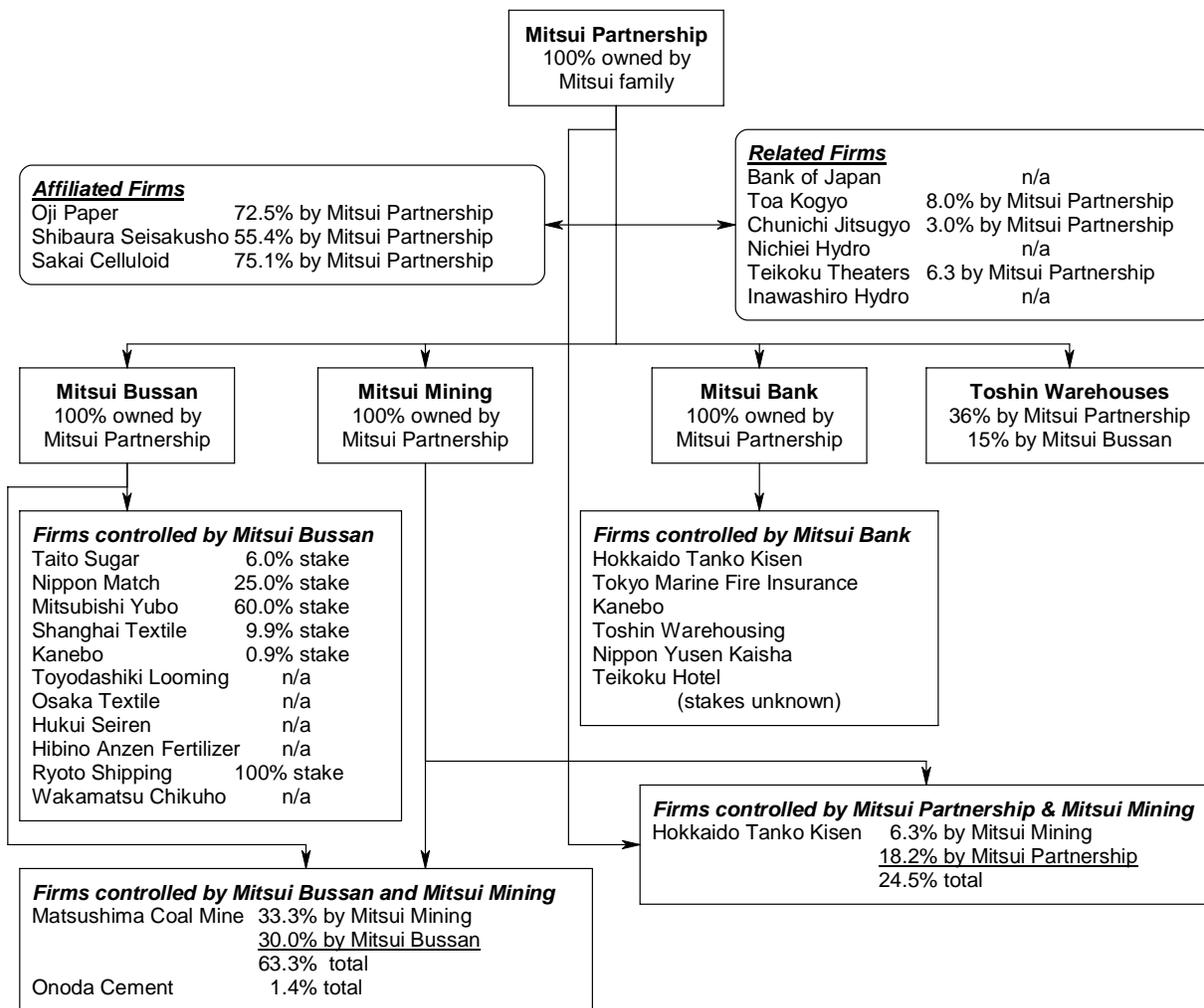
The Mitsui were the country's oldest and wealthiest silk merchants, and used their accumulated wealth to buy a host of SOEs. Some, like the Shinmachi and Tamioka silk textiles mills, related to their traditional business. But their most important ex-SEOs were mines – especially the Miike coal mines.

The family's first distinct firm outside the silk trade was the Mitsui Bank, established in 1876. This was organized to let the family invest in new ventures without risk to its traditional silk business. To establish a fire break, the family cast out Takenosuke and Yonosuke Mitsui, representing two major subclans, and they legally renounced their Mitsui birthrights.⁹ Takenosuke and Yonosuke owned Mitsui Bussan, a trading company, which funneled Mitsui money into various risky business ventures, including maritime shipping. Mitsui Bussan's charter acknowledged control by Mitsui Bank, which had no assets.

⁹ Their birth certificates were restored after an 1893 legal reform allowed limited liability for joint stock companies, obviating the need for a pretended division in the family.

Figure 2. The Mitsui Pyramidal Group, 1914

Controlling corporate shareholder's control stake is indicated where available. In some cases, control is clear but the precise size of the control block is unknown. Related firms were likely influenced, but were not unambiguously controlled, by the Mitsui Partnership.



Source. Constructed using data in Yasuoka (1982, pp. 222-223) from the Mitsui Archive, as in Morck and Nakamura (2004).

Mitsui Bussan earned fat commissions shipping coal from the state-owned Miike mine to China, a trade that provided the Meiji reformers with much natural resources revenues during their ill-fated state-led “big push. The Mitsui bought this SOE outright in the mass privatization, and used it as a cash cow for decades. The family also bought several textiles SOEs, which complemented their existing silk business, and modernized all of these. The family’s business group now included Mitsui Bank; Mitsui Mining, which controlled its mines; Mitsui Bussan, which handled its coal trade and the general merchant shipping business that grew from it; the Mitsui clothing stores (later renamed Mitsukoshi); Mitsui Real Estate; and Mitsui Industry, which owned the families silk factories as well as the Shibaura electric works, needed to modernize the family’s other operations. Mitsui Bussan, Mitsui Bank and Mitsui Mining were fully owned by the Mitsui family. The Mitsui Bank owned equity control blocks in Oji Paper and Kanegafuchi Boseki (Kanebo) Textiles, with minority shares held by the public. Mitsui Mining generated earnings funded diversification into banking, for their customers and suppliers needed

financial services; electrical equipment, needed to modernize their textile mills; and then industries made necessary or viable by the expansion of their existing operations and the economy overall.

A pyramidal structure was evident early on. The family's wealth was consolidated as Mitsui Partnership, which owned equity control blocks in a first tier of firms, some listed and other unlisted, some of which owned equity control blocks in yet other listed or unlisted firms. As Japan's stock markets developed into reliable sources of capital, the Mitsui could control yet more new joint stock companies in yet more additional lines of business.

From the late 1890s through the early 1920s, the pyramid expanded and changed shape. New firms appeared in each tier, and initially unlisted firms throughout the structure went public to finance their own expansion, or to capitalize yet more controlled subsidiaries. Soon most Mitsui firms were listed, for groups capital needs had outpaced Mitsui Mining's revenues.

All these firms nonetheless remained fully controlled by the Mitsui Partnership, either directly or indirectly, though the Mitsui family's actual ownership stake varied substantially. Pyramidal business groups of this sort came to be called *zaibatsu* in Japan. Figure 2 depicts the Mitsui *zaibatsu* in 1914.

Pyramid groups of this sort are the private sector structures that we propose are able to "simultaneously plan the industrialisation of several complementary industries", as Rosenstein-Rodan (1943) requires. The family's apex firm, the Mitsui Partnership, controlled every firm in a huge group spanning a broad cross section of industries. This common control prevented "hold-up" problems and allowed central coordination of the establishment and growth of firms throughout the economy. We speculate that the Mitsui pyramidal group, and others like it, took over where the Meiji state had failed, and saw Japan's "big push" through to successful completion in the 1920s.

As this pyramidal structure grew, adding successive tiers of controlled publicly listed firms, and occasionally more intricate crossholdings, the family occasionally repositioned firms. Morikawa (1980) and others argue that placement in a higher tier signifies a greater family "concern" for more important firms. However, in 1904, the family moved Mitsukoshi, its original silk business, to a low tier after its 1904 transformation into a department store chain; and also moved Oji Paper and Kanebo, firms of national prominence, to lower tiers. Shibura Engineering Works, which merged with Tokyo Electric to form Tokyo Shibura (Toshiba) Electric in 1939, was also in a low tier. General Electric confirmed Shibura's importance when it bought a 25 to 30% stake in 1904 for technology licensing.

It seems plausible that economic factors influenced individual firms' positions in the pyramid. Morikawa (1980, pp. 46-57) notes that firms in higher tiers exhibit low risk and high earnings. Higher tier firms in such a structure are diversified portfolios of their own real assets plus a portfolio of shares in other firms, so low risk is readily explicable. Positioning cash cows in the upper tiers gives the family greater ownership of their cash flows, and so enriches the family. Bae et al. (200x) show Korean chaebol restructuring themselves analogously in the late 20th century, with equity blocks being transferred at prices favorable to controlling families.

But another explanation is also plausible. Pyramidal groups are prone to tunneling: the shifting of wealth via trade in goods or capital investments between controlled firms at other than market prices (Johnson et al. 200X). Tunneling can be used to siphon wealth up to the apex firm so the controlling family can avoid sharing lower tier firms' profits with their public shareholders (Bebchuk et al. 2000). But tunneling also lets some firms in the group subsidize others, perhaps even those operating at inefficient scales to produce inputs other group firms needed, a role Rosenstein-Rodan assigns to the state.

For example, Mitsubishi Iron and Steel, established around WWI, incurred ongoing losses because its technology was inefficiently scaled. The Mitsubishi Partnership (the apex firm) absorbed these accumulated losses when the steelmaker wrote down its capital by five million yen in 1924, and injected further subsidies of ¥12.5 million in 1924 and ¥11 million yen in 1928. This money came from dividends Mitsui Partnership received from the group's mining and, shipbuilding firms. The

steelmaker's efficiency improved through the 1920s as its scale of operation expanded (Okazaki, 1933; Miyajima, 2004). The Mitsui Partnership provided similar subsidies to the group's Wanishi Iron and Steel Works and Kamaishi Iron and Steel Works at about the same time, until retooling and expansion improved their efficiency as well (Miyajima, 2004).

Another example is the introduction of rayon – called artificial silk in Japan. Western firms that invented these products guarded their intellectual property jealously, so Japanese firms had to develop their own technology from scratch. The Suzuki zaibatsu, controlled by Naokichi Kaneko, used earnings from other group firms to develop the “viscose” method for producing artificial silks in 1904. By 1918, Teikoku Rayon (now Teijin) – partially owned by Kaneko directly – was in business in Yonezawa, and over the next eight years the group built three more plants. By 1937, Japan was producing as much rayon as the United Kingdom.¹⁰

Concentrating cash in upper tier firms also helps the group raise public equity on better terms. As Berle and Means (1932) show, pyramidal group member firms are subject to an extreme separation of ownership from control. To see this, consider Matsushima Coal Mining, a firm controlled by Mitsui Bussan and Mitsui Mining, whose combined stakes total 63.3%, and whose other shares are owned by small diffuse investors. Suppose that Matsushima Coal Mining set up a new listed subsidiary to be 51% financed with its accumulated cash and 49% financed with public equity issues. The new firm is then 51% owned by Matsushima Coal Mining, which is 63.3% owned by Mitsui Bussan, which is 100% owned by the Mitsui Partnership (the family). This means that ¥100 in the new firm equals 51% x 63.3% of ¥100, or ¥32.3 of family wealth; while ¥100 in either Mitsui Mining or Mitsubishi Bussan equals ¥100 in family wealth since both are 100% family owned. Consequently, in business dealings between the new firm and, say, Mitsui Bussan, the family would benefit threefold for every yen the new firm lost to the old one. This is fine for the family, but the new firm's public shareholders would consider such dealings a governance problem. In contrast, were the new firm a 51% subsidiary of Mitsui Bussan, the family would only benefit roughly twofold for each yen lost by the new firm. This logic puts more opaque firms, in which public shareholder trust is more violable, nearer the apex, where the family's incentive to self-deal is less. It also suggests that the group is best served by positioning new listed firms closer to the apex, since the family's temptation to self-deal is stronger in new firms in lower tiers of the pyramid, and public shareholders would consequently pay less per yen of assets for their shares.

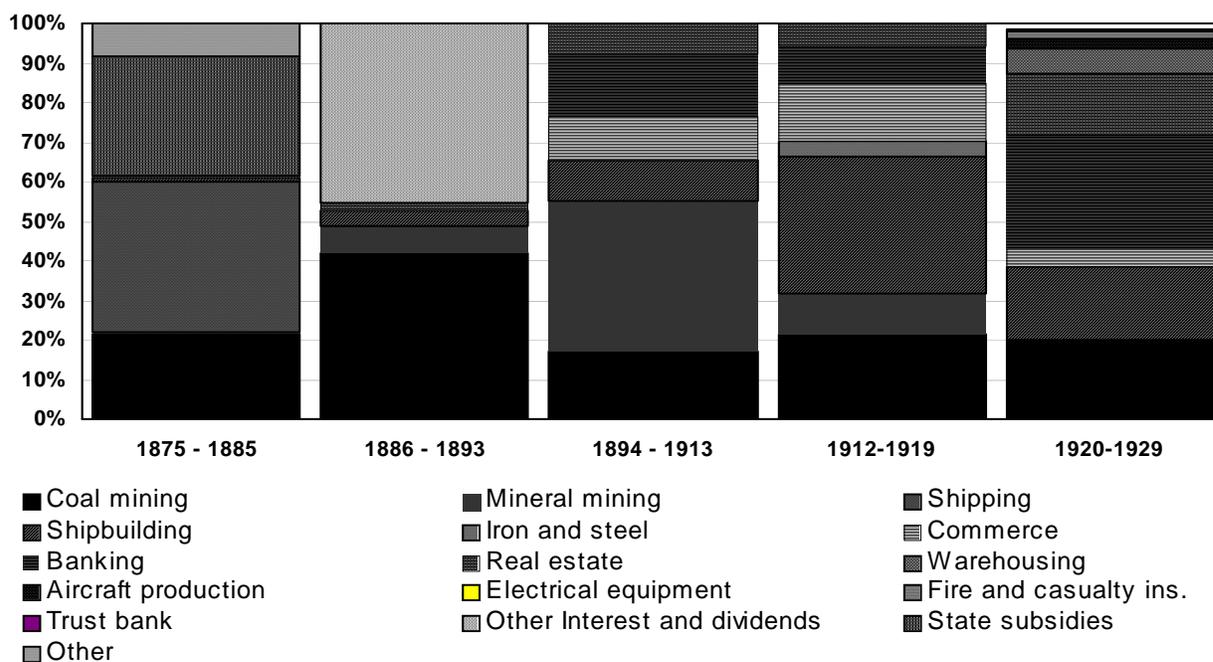
Records attest that the Mitsui Partnership carefully positioned each firm in the pyramid, and carefully selected what stakes each company should hold in other group firms. As the zaibatsu grew ever more complex from 1912 to 1930, lower tiers were periodically restructured, but upper tiers changed little. The Mitsui Bank, Mitsui Bussan, Mitsui Mining and Toshin Warehousing remained direct subsidiaries of the Mitsui family partnership. The only significant change was the addition of the Mitsui Life Insurance and Mitsui Trust Bank as direct subsidiaries after 1912.

Mitsui's most intensive diversification began with Mitsui Mining's entry into chemicals in the early 1910s. The Mitsui textiles business needed dyes, and a Mitsui chemicals firm could develop in tandem with their textiles mills. Mitsui Bussan founded a shipbuilding company in 1917 to complement its export shipping needs, an iron and steel firm in 1924 to provide for its ship building and electrical equipment operations, and established Toyo Rayon as an entrée into artificial fibers. This coordinated diversification was entirely via new subsidiaries of Mitsui Mining, the Mitsui Bank and Mitsui Bussan, or through new subsidiaries of their subsidiaries.

This seems consistent with a privately orchestrated big push. The Mitsui responded promptly to each successive legal reform with greater use of public equity. Expansion thus became less dependent on natural resources revenues over time, though Figure 3 shows the group's mines remained economically important through the 1930s.

¹⁰ See Miyajima (2004) and Teijin's website at www.teijin.co.jp/english/eco/index.html.

Figure 3. Fraction of Mitsui group firms' revenues from coal mining versus other sectors.



Source:

The industries in which new Mitsui firms appeared were often ones declared priority areas by the government, but subsidies were scant and favoritism of little value in the laissez-faire environment of these decades. Legislators still shuddered at undermining public finances again.

5.2 Mitsubishi

Another great pyramidal business group, with firms scattered across the economy, was the Mitsubishi zaibatsu, built around a shipping firm founded by the upstart entrepreneur, Yataro Iwasaki(1834-1885) in 1872. Iwasaki understood Western accounting, a rare skill at the time, and leveraged this into a genuine business edge, especially in dealings with foreigners. But he was also adept at extracting monopolies and favors from the government.

Mitsubishi was a maritime shipping firm, and Iwasaki took pains to remind the Meiji reformers that he ran a “national champion” and to cooperate overtly in all the government’s development plans to earned official favors. Thus, the Postal Steam Ship Co. lost its government account to Mitsubishi, and the state bought all the failing competitor’s ships and simply gave them to Mitsubishi. From 1875 on, Mitsubishi’s newly established Yubin Kisen Mitsubishi Kaisha shipping company received annual payments of ¥250,000 for carrying government mail.

Most of this was a pure subsidy to protect Mitsubishi from foreign competition. More subsidies flowed in via Nagasaki Shipyard, and SOE that repaired and maintained Mitsubishi ships – probably at cut rates. Other shipping firms, foreign and Japanese, could not compete and, by the mid 1870, most large ships in Japanese ports belonged to Mitsubishi. The Meiji reformers saw domestic control of foreign trade as a key strategic objective, and deliberately subsidized Mitsubishi to lock in a Japanese monopoly. Although privately owned, Mitsubishi enthusiastically cooperated with the government at every turn. Iwasaki sought to make Mitsubishi an integral part of the government’s planned development push.

Mitsubishi thus both accumulated wealth during the state-led “big push” of the 1870s, and loyally stepped forth to buy SOEs in the subsequent mass privatization. In addition, Mitsubishi bought Japan’s most prominent ex-SOE, the already privatized Takashima coal mines. The politician Shojiro Gotowho initially bought these from the government, but ran them poorly. Iwasaki, emphasizing the huge favor he was doing for the government in rescuing the unfortunate Goto, relieved him of the mines in 1881. Takashima Coal Mining continued producing for decades, and became the group’s primary “cash cow”.

In fact, Iwasaki’s maritime shipping firm needed a reliable source of coal; and could now export Takashima coal directly to China. Imposing double entry bookkeeping, shedding excess staff, and firing loafers, Iwasaki soon turned the mines into a profit center. To leverage the technological and labor management expertise Iwasaki acquired at Takashima, Mitsubishi acquired over twenty more coal mines from 1884 through 1911. Of these, eleven became large-scale “cash cows” that kept funding Mitsubishi expansion as Takashima’s relative importance waned.

In 1887, Mitsubishi bought another SOE, the money-losing Nagasaki Shipyards, which it had operated for the government since 1884. Mitsubishi next took over the country’s largest ship maintenance, shipbuilding and iron production facilities in Yokohama.(Kobayashi, 1977). Iwasaki expanded and modernized the Nagasaki Shipyards, and aggressively hired graduates from Japan’s new engineering universities and others with modern training. By 1899, the thoroughly rebuilt Nagasaki facility was building state-of-the-art steel ships.

From 1891, group was organized as single conglomerate, with divisions corresponding to each operating business, controlled by the Mitsubishi Limited Partnership, the Iwasaki family’s firm. By the late 1880s, all interdivisional transactions passed through the 119th National Bank. Its double entry bookkeeping reveals big push coordination in action. Each member firm’s profit after depreciation redounded to the partnership, and after 1896 a 2% per day interest charge on excess working capital insured timely compliance. In this way, profits from mines and subsidized maritime shipping were reallocated to capitalize new lines of business, to expand existing lines of business with growth opportunities, and to subsidize lines of business operating losing money but deemed essential to the whole.

Many more distant Iwasaki relatives used their income from the partnership to set up businesses of their own. This practice was especially useful when the government’s subsidy condition Mitsubishi’s shipping, was that it not expand into other lines of business. Thus, Iwasaki relatives established Meiji Life Insurance in 1881. Other Mitsubishi companies appeared in glass making (Asahi Glass, 1907), brewing (Kirin, 1907) and other industries. These initially had little to do with the Mitsubishi Partnership, but apparently remained subject to it and dependent on it for capital expansion. Thus, the Mitsubishi partnership ruled over a constellation of lesser firms in addition to the Mitsubishi conglomerate.

The partnership ran an experiment from 1909 through 1913 that illuminates its economic function. The family had relied on division managers for information about investment opportunities, and opted in 1909 to let the minerals mining division retains 90% of its earnings and invest them directly; and in 1911 granted the same privilege to its other mining, shipbuilding, and sales divisions; and let the real estate division keep 96% of its earnings. However, the division managers, especially those in mining and shipbuilding, opted to pile up retained earnings and rarely funded any new investment. This was entirely rational since they had no stake in the value of the group as a whole.

By 1912, the family terminated the trial, and by 1913 reasserted its role as the nerve center for all divisions, save shipbuilding. Thenceforth, divisions would provide the head office detailed pro forma accounting statements, and it would then determine retention levels, borrowing, and capital budgets for each division. The head office planned growth opportunities that affected more than one division, and

entry into new industries. This nicely highlights the importance of the head office's cross-industry central planning in big push growth strategies.

The experiment also highlights how Mitsubishi, originally dependent on state subsidies to its shipping operations, now depended on its 'cash cow' divisions, mostly mines, to finance growth. Profitable divisions with demonstrably profitable growth opportunities could retain past profits. Other divisions depended on the Mitsubishi Partnership to provide funding from other divisions' retained earnings.

By the 1910s, the Mitsui had demonstrated the efficacy of the pyramidal structure in Figure 4, then widely used throughout the world, for raising vast amounts of equity capital from public investors while keeping tight family control over all decision-making. Mitsubishi, running up against investment constraints imposed by limited retained earnings, followed suit. Mitsubishi Mining was reorganized as a separate corporation, and listed in 1920. Subsequently, one by one, the other major Mitsubishi went public as controlled listed subsidiaries, and many then issued yet more shares.

Some of these secondary issues were leverage-reducing recapitalizations, which let the subsidiaries pay off their debts to the Mitsubishi Bank. By the 1920s, most Mitsubishi Bank loans were to individuals and businesses unaffiliated with the group, and by 1928 most Mitsubishi firms were entirely free of bank debt, though some had outstanding bonds. This strategy helped the group weather coming financial crises – the Great Kantō Earthquake of 1923 and the Great Depression of the 1930s.

Equity issues thus superseded retained earnings from mining and other existing businesses as the group's major source of capital. But this soon encountered another constraint. Public equity issues steadily diluted the Mitsubishi Limited Partnership's equity stakes in its listed subsidiaries – from an average of 85.5% in 1921 to only 69% by 1928. If the family's control blocks dropped below 50%, the group's first tier firms would be vulnerable to takeovers. These subsidiaries no longer issued more of their own shares, so another source of capital was needed.

The solution lay in a more faithful imitation of Mitsui. Mitsubishi's listed subsidiaries would obtain capital, not by issuing more of their own shares, but by listing new controlled subsidiaries of their own. These could issue additional shares until more would jeopardize the first tier subsidiary's control over its second tier subsidiary. At that point the second tier subsidiary could list a third tier subsidiary. Successive tiers of subsidiaries no doubt exacerbated public shareholders' concerns about self-dealing and other governance problems in firms so indirectly owned by the family, but fully family-controlled nonetheless. Thus, by 1928, the Mitsubishi group had a multi-tiered pyramidal structure too.

Table 5 presents a snapshot of the Mitsubishi zaibatsu apex firm's investments in other group firms and the cash flows those investments generated for it, as of 1935, near the end of Japan's *laissez-faire* era. Mining continued to be the group's major "cash cow", still generating over a third of the head office's income stream.

Mitsubishi was visibly close to the Meiji government, and this both helped and hurt it. The group benefited greatly from subsidies during the state-led "big push of the 1870s, and acquired lucrative "cash cow" mines in the mass privatization of the 1880s. But the next decades were a liberal era, and the group's visible proximity to high officials now made it vulnerable. Even by the late 1870s, the tide was turning and rivals of its political supporters attached the firm for manipulating shipping and passenger fares. The retirement of two of Mitsubishi's most important political connections, Toshimichi Okubo and Shigenobu Okuma, heralded more attacks, now against Iwasaki for diverting government subsidies to Mitsubishi's shipping monopoly into other businesses.

In 1882, the government forbade Mitsubishi from operating in any businesses other than shipping on pain of losing further subsidies, and approved Mitsui's new maritime shipping firm, *Kyodo Unyu Kaisharun*, run by military officers. The competition halved Mitsubishi's shipping revenues by 1883. Appreciating the cost of disharmony in 1885, Iwasaki agreed to merger the two shipping firms into

Nippon Yusen Kaisha, renamed Nippon Yusen Kabushiki Kaisha (NYK). This let Mitsubishi remain in mining and other sectors.

Table 5. The Mitsubishi Pyramidal Group's Apex Firm in 1935

Sources of dividends and interest paid to the Mitsubishi apex firm, and its equity and debt investments, by Mitsubishi zaibatsu member firm as of 1935. Asterisks indicate direct subsidiaries of the apex firm. Other firms are in lower tiers of the pyramid.

| | <u>Dividends + Interest</u> | | <u>Investment stake</u> | |
|---------------------------------|-----------------------------|------|-------------------------|------|
| | x ¥1,000 | % | x ¥1,000 | % |
| All holdings | 14,507 | 100% | 180,435 | 100% |
| Mitsubishi Mining* | 4,946 | 34% | 43,381 | 24% |
| Mitsubishi Bank* | 2,493 | 17% | 31,160 | 17% |
| Mitsubishi Heavy Industry* | 2,213 | 15% | 30,867 | 17% |
| Mitsubishi Corp* | 1,356 | 9% | 22,500 | 12% |
| Mitsubishi Electric* | 1,325 | 9% | 13,500 | 7% |
| Mitsubishi Warehouses* | 21 | 0% | 10,000 | 6% |
| Tokio Marine Ins | 1,202 | 8% | 7,513 | 4% |
| Nippon Iron/Steel | 371 | 3% | 5,938 | 3% |
| Mitsubishi Oil* | 0 | 0% | 2,100 | 1% |
| Nippon Yusen (NYK) | 99 | 1% | 2,023 | 1% |
| Meiji Life | 0 | 0% | 1,950 | 1% |
| Mitsubishi Steel | 55 | 0% | 1,446 | 1% |
| Mitsubishi Trust* | 79 | 1% | 1,313 | 1% |
| Ryoka Warehousing | 0 | 0% | 1,009 | 1% |
| JVC | 200 | 1% | 909 | 1% |
| Tawao Industries | 0 | 0% | 480 | 0% |
| Wakamatsu Chikuko | 43 | 0% | 440 | 0% |
| Manchuria Takushoku Public Corp | 0 | 0% | 390 | 0% |
| Nippon Kokusan Kogyo | 0 | 0% | 379 | 0% |
| Nanyo Pearls | 45 | 0% | 300 | 0% |
| Kyushu Transmission Lines | 17 | 0% | 281 | 0% |
| Other | 42 | 0% | 2,558 | 1% |

Source:

5.3 Sumitomo

The Sumitomo family ran the Besshi copper mines for centuries under a Tokugawa mandate. The Meiji reformers expropriated these mines, along with all others in the country; but quickly realized they needed Sumitomo expertise to operate them. The government returned the mines to the Sumitomo a month later, but the family's general manager, Saihei Hirose, never again trusted the reformers. Sumitomo bid for none of the SEOs offered for sale in the mass privatization program, and unlike Iwasaki, kept his distance from the Meiji reformers.

Nonetheless, he immediately set about thoroughly modernizing the Besshi operation, hiring Pumpelly and Blake students, as well as any engineers and technicians he could find with foreign training. Sumitomo thus indirectly participated in the mass privatization by acquiring the SOE mines' finest talent.

Saihei Hirose also believed in focus, so Sumitomo remained an undiversified copper firm until his departure. The group's second firm, Sumitomo Bank, was thus not established until 1895. The bank grew quickly though, and overshadowed Mitsubishi Bank by the early 1900s.

The Sumitomo forestalled diversifying until clear bargains were on offer. Japan boomed during World War I, but entered a deep recession thereafter, especially after the Great Kantō Earthquake

destroyed a substantial fraction of its modern infrastructure in 1923. Flush with copper mining revenues, Sumitomo Copper and the Sumitomo Bank were well positioned to acquire fundamentally sound, but financially distressed firms (Hatakeyama; 1988).

Like the Mitsui and Mitsubishi, the Sumitomo expanded first into complementary or vertically related lines of business, and then more widely. From copper mining, they entered bulk copper and copper wire production and iron and coal mining; and from the latter into iron and steel production. Complex business dealings required sophisticated financial services, hence the Sumitomo Trust Bank in 1926. Shipping and storing valuable metals and metal products required insurance, so the Sumitomo acquired first Hinode Life Insurance in 1925, which they rechristened Sumitomo Life Insurance, and then Fuso Marine Fire and Casualty Insurance in 1930, which they renamed Sumitomo Marine Fire and Casualty Insurance. To justify boosting the scale of their coal mining operations, the Sumitomo created Sumitomo Chemicals to produce ammonia/nitrogen fertilizer at new coal-based chemicals plants in 1928.

The Sumitomo sought no public equity until the pyramidal model was well proved. Their untiring cash cow, Besshi Copper Mines, continued yielding healthy profits, but by 1909 Mitsui and Mitsubishi mining operations both generated far more, and accumulated retained earnings were sufficient to snap up the best bargains on offer in the 1920s. But with these spent, the Sumitomo needed further capital. Their first listed firm was Sumitomo Fertilizer, taken public in 1934 (Miyajima, 2004, pp.218-220). From this point on, Sumitomo firms went public one-by-one, and the group stretched into a pyramidal structure like that of Mitsubishi and Mitsui zaibatsu (Miyajima, 2004).

5.4 Nissan

Japan's fourth great zaibatsu is, in some ways, the most interesting. The Mitsui and Sumitomo pyramids were built around old money, and Mitsubishi was built around government subsidies and the wealth of a new family, the Iwasaki. Nissan, in contrast, was built with public equity virtually from its conception. Since Nissan was a latecomer, the pyramidal model was already well-tested. Besides, Nissan's impecunious founders – Huanosuke Kuhara and his brother-in-law, Yoshisuke Aikawa – had no accumulated earnings hoard or government connections, so public equity was their only option.

During Japan's World War I boom, its mines were in producing at capacity to supply the Allies. Taking advantage of public investors' appetite for resource stocks, Kuhara floated a ¥2.4 million IPO to capitalize Kuhara Mining. He then embarked on a spate of takeovers, and by 1919, Kuhara Mining controlled 50% of the country's silver mining, 40% of its gold mining, and 30% of its copper mining; as well as a trading company, Kuhara Trading.

With Versailles signed, the urgent wartime demand for metals vanished in 1919 and Kuhara Trading could not balance its books, threatened to pull down Kuhara Mining. Kuhara retired and Aikawa, a U.S. trained engineer with up-to-date training in iron casting, took charge. Aikawa had navigated his own small firm, Tobata Cast Iron, through the postwar turbulence.

Aikawa put his own savings into Kuhara Mining, and jawboned relatives, managers, and outsiders for capital, ultimately raising more than ¥25 million for the firm. This kept Kuhara Mining afloat, and Aikawa was soon its president.

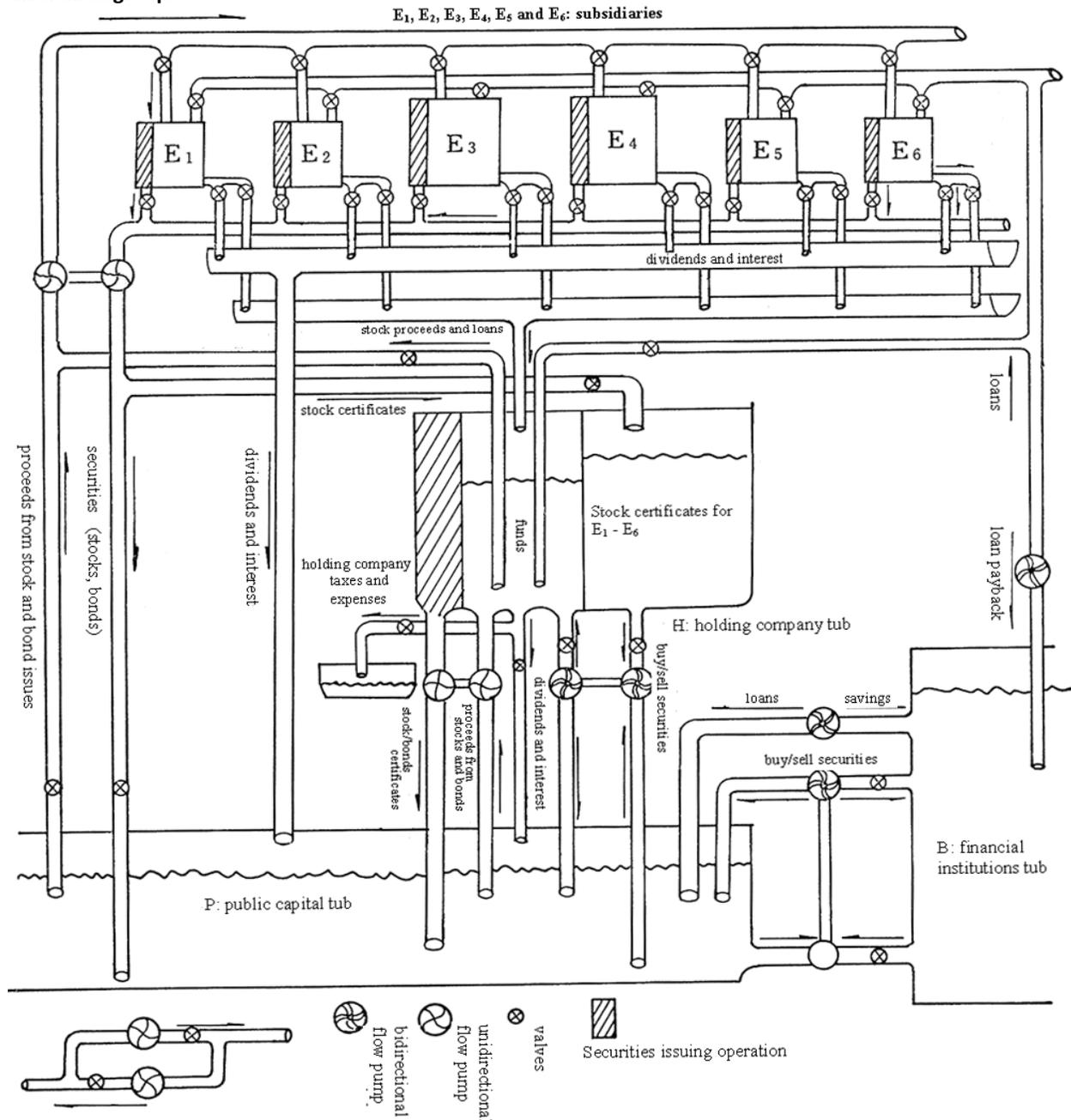
But the firm's long-term financial health was still uncertain. To raise more capital in 1928, he listed a new holding company, Nippon Sangyo, or Nissan. Nissan then used these funds to capitalize a subsidiary, Nippon Mining, which Aikawa then merged with Kuhara Mining. This reverse takeover left Nippon Mining listed, but controlled by Nissan, which was widely held. Nissan was now in a position to capitalize more listed subsidiaries, and these could capitalize yet more listed subsidiaries.

Aikawa rapidly built a large, diversified pyramidal group beneath Nissan, expanding the pyramid aggressively by acquiring control blocks in existing companies, a far faster growth trajectory than building new facilities from scratch would have allowed (Udagawa, 1976). Nissan soon had major

new subsidiaries in heavy industry, chemicals, electric power, and other industries; and these soon had their own listed subsidiaries as well. Content with equity financing and averse to debt because of the near bankruptcy of Kuhara Mining, Aikawa saw no need for Nissan to have a bank, and kept the group's member firms from running up leverage.

Figure 4. Aikawa's Diagram of the Nissan Pyramidical Group

Capital is pumped from the public capital tub at the bottom up to the operating subsidiaries at the top – directly, through the Nissan holding company tub in the center, or through the financial institutions tub at the lower right. By turning one-way and bidirectional valves, Aikawa could adjust the level of capital in each operating subsidiary to its needs, subsidizing weak but necessary units with the overall profits of the industrially diversified group.



Source: Aikawa (1934), translations by Morck and Nakamura (2004).

This was a new model for Japan. The Mitsui, Mitsubishi and Sumitomo pyramidal groups tapped public equity extensively, but always via controlled subsidiaries. Their apex firms were unlisted family firms; whereas the new group's apex firm, Nissan, was widely held. This is important, for it exposes the "big push" coordination role of the apex firm, which could only be inferred from circumstantial evidence in the Mitsui, Mitsubishi, and Sumitomo zaibatsu. But Aikawa spells the logic out in Figure 4, taken from his autobiography with the accompanying explanation translated in Morck and Nakamura (2004).

This diagram represents Nissan and its directly owned subsidiaries as a plumbing system, through which money flows. Nissan was widely held, so Aikawa had to keep its shareholders satisfied. He was irreplaceable (Shleifer and Vishny, 1989) only if Nissan's shareholders believed his technical expertise and managerial talent made him so. To sustain this belief, he built the business group around a Nissan paying a steadily growing dividend. This is the flow through the central pipe of the five extending downwards from Nissan, his 'public holding company tub'. The valve in that pipe is set to drain the tub's central reservoir – containing Nissan's retained earnings – slowly enough that fluctuations in its level do not affect the dividend flow into the 'public capital tub' at the bottom of the diagram. Nissan's other two compartments hold capital from securities issues (left) and treasury securities sales (right).

Money levels in Nissan's many operating subsidiaries, the smaller capital tanks at the top of the diagram, are equalized by drainage into a common pipeline extending to Nissan and their public shareholders. The prominent bidirectional valves on the pipe linking their primary inflow and outflow pipes is adjustable, as is the flow directly out of the top of the holding company tub, letting Aikawa raise or lower the overall water levels in all the subsidiaries and prevent profitable ones from accumulating earnings and less profitable ones from draining empty. A parallel system of debt financing pipes tapping water from a financial institutions tub completes the system.

Aikawa (1934, p. 13) specifically justifies using overall profits to subsidize losses in firms needed by other firms, and investing in "a few new business lines" that would lose money, but were nonetheless likely to augment Nissan's long run financial health and "important to the nation". These ventures included an auto manufacturing firm, subsequently named Nissan Motor, an Antarctic whaling business, and a broadcasting company Udagawa (1976, p.134, p.142.) This cross-industry and intertemporal subsidization, financed by current earnings first from mining, and then from the nation's savings plus the earnings of firms populating a broad-based cross-section of industries, is precisely the "big push" development strategists envision (Murphy et al. 1989).

As Nissan expanded, Aikawa structured intercorporate voting blocks and crossholdings so that Nissan controlled every firm in the group. This was presumably necessary because big push growth requires transfers between firms to coordinate growth rates across industries, and optimizing the overall gains of the group, as reflected in Nissan's own share price, might require sacrificing the interests of one of its subsidiaries at times. The shareholders of the listed subsidiaries so conscripted to might wish to block such a transaction. Nissan's control blocks let Aikawa ignore argumentative shareholders in such circumstances.

Nissan's shares remained relatively buoyant through the Great Depression (Udagawa, 1976, p.122); and its repeated seasoned equity issues to finance opportunistic M&A in the bear market were well-subscribed. Aikawa's overall strategy was to buy promising firms, grow them as fully owned subsidiaries, and then relist them as controlled subsidiaries (bunshin kaisha).

Aikawa's (1934) autobiography repeatedly stresses his duty to Nissan's shareholders. The group's apex firm was widely held, so he had to make it always made acceptable profits and paid acceptable dividends. This meant that individual Nissan companies were managed in the interest of the Nissan group as a whole. To Aikawa, this mandated broad diversification, so Nissan firms could depend on other Nissan firms, rather than on arm's length transactions. By 1937, the group included Nippon Mining, Hitachi, Ltd., Hitachi Power, Nissan Motor and numerous other large manufacturers and utilities.

The Nissan pyramid expanded rapidly, as did the widely held apex company. The apex firm's shareholder base rose from 20,000 in 1934 to 51,804 in May 1937, and 98% owned fewer than 500 shares each. Only 33 shareholders owned more than 10,000 shares, and the Aikawa family's combined stake totaled only 5.2% by 1937 (Udagawa, 1976).

5.5 Suzuki

The Mitsui, Sumitomo, Mitsubishi, and Nissan zaibatsu were the greatest of the great pyramidal business groups that dominated prewar Japan's economy. There were many other somewhat smaller groups that shared the same pyramidal structure and extensive economy-wide diversification. Of these, the most interesting is the Suzuki zaibatsu, which ultimately failed. That failure was, in no small part, due to the Suzuki group's lack of a mining cash cow, and thus underscores the importance of natural resources in Japan's initial industrialization.

The Suzuki group was built largely from the revenues of the Taiwan Bank, a large bank the group totally controlled, but in which its controlling shareholder, Naokichi Kaneko, had virtually no direct financial stake. The bank took in deposits and lent money to Suzuki group firms for industrial investment, financing cross industry coordinated "big push" growth much like that undertaken by the other great zaibatsu. However, this highly leveraged financial structure proved unsustainable in a downturn. Captive banks like the Taiwan Bank came to be called "organ banks" by Japanese economic historians.

Victory in the 1894 – 1895 Sino-Japanese War left Japan in possession of the Chinese island of Taiwan. The Suzuki business group began as a sugar cane refining operation in Taiwan, which established a shipping company to transport sugar to Japan. By the Great War, the Suzuki zaibatsu's foreign trade exceeded that of Mitsui Bussan; and after the war, the group aggressively capitalized new firms in industry after industries. By 1923, the Suzuki group was roughly as large and highly diversified as the Mitsui or Mitsubishi groups.

That year, Kaneko reorganized the group under a new apex firm, Suzuki General Partnership that directly or indirectly controlled seventy-eight different listed firms, each financed with a mixture of public equity and loans from the Taiwan Bank. Of these, ten were in food industries, twenty four in chemicals, four in textiles, two in tobacco, five in mining, five in iron and steel, three in electric machinery, three in electric power, three in railways, two in shipping, two in fishing, two in real estate and warehousing, three in development, two in the banking and trust business, and four in insurance, three in commerce.

The group's death knell was the Great Kantō Earthquake, which destroyed much of Tokyo and Yokohama on September 1st, 1923. The quake destroyed much of Japan's modern infrastructure and disrupted trade credit and normal financing arrangements badly. The Taiwan Bank, invested almost fully in damaged industrial property plant and equipment, was crippled, and Kaneko's disdain for investing in political connections left it without supporters in government. The bank failed, leaving all the Suzuki companies with no access to working capital. The entire group collapsed shortly thereafter.

The Mitsui, Sumitomo, Mitsubishi and Nissan groups survived this crisis despite absorbing earthquake damage. Their mining firms' assets in the ground provided security for emergency loans, their mining earnings provided emergency cash, and their group banks were not threatened, having lent mainly to unrelated borrowers throughout Japan. Counterfactual history is oxymoronic, but it seems not implausible that natural resources wealth could have saved the Suzuki pyramidal group too.

6. Natural Resources and the "Big Push"

From the mass privatization to the 1920s, Japan was one of the world's great economic success stories. Figure 5 shows its real per capita GNP more than doubled from 1885 through the Great War, paused

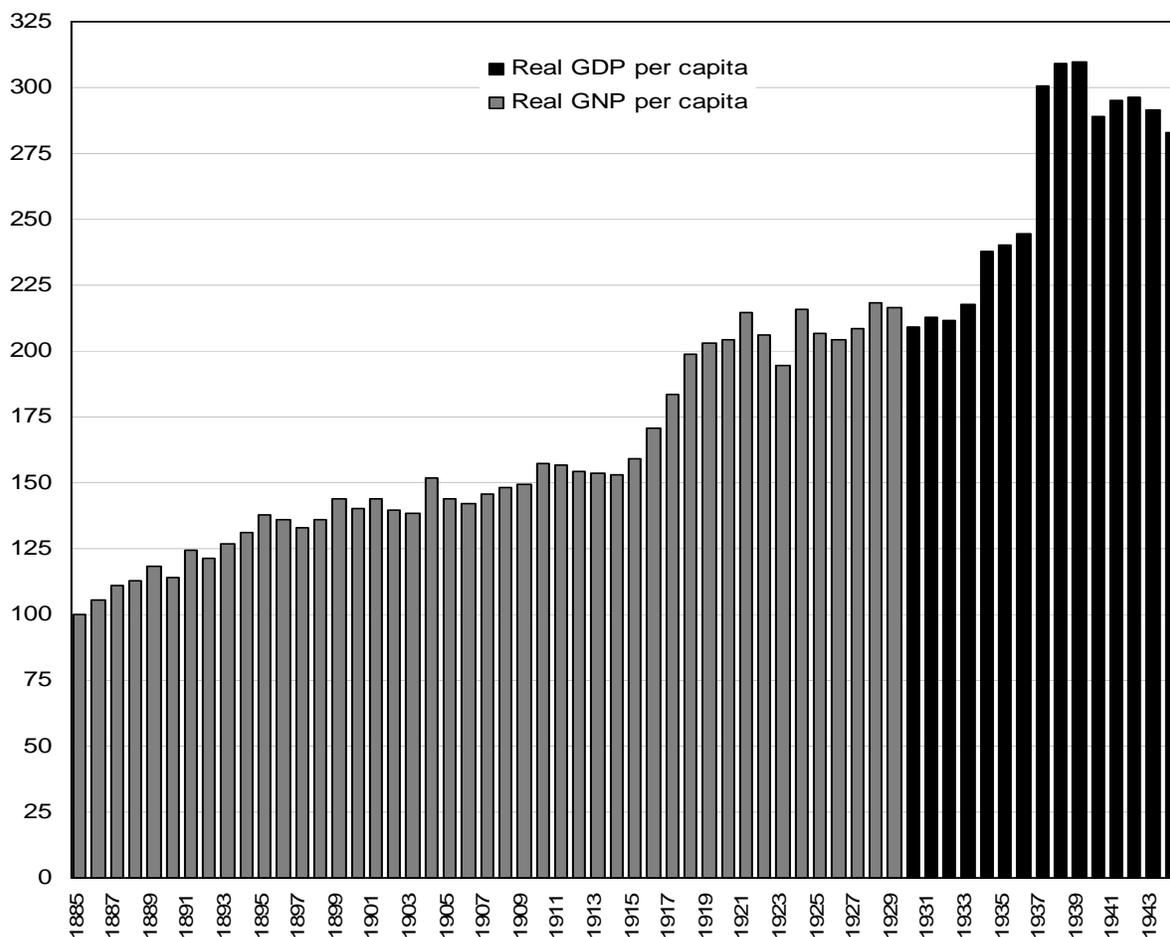
during the post-war recession and the aftermath of the Great Kantō earthquake of 1932, and then rose sharply again as World War II began.

The Japanese economy's sectoral composition also began looking like that of resource rich Western countries by the 1920s. Figure 6 shows a clear rise of industries like steel and electrical machinery accompanying a steady decline of copper and coal mining, as well as cotton spinning. Figure 7 shows that, by the 1920s, Japan had an economy structurally similar to that of Canada, another late 19th century economic debutant; though both depend more on agriculture, forestry, and the like than earlier industrializers. Extractive industries in Japan are a tinier fraction of economy output by this time than in Canada, France, Germany and the United States.

As this rapid development process occurred, Japan retained its status among the world's major natural resources producer. Figures 8, 9, and 10 graph the output of the world's largest copper, coal, and silver producing countries, and show Japan placing among the top few. Moreover, although other countries were relatively more important, Japan also ranked as a major producer of gold and iron ore through this period.

Figure 5. Japanese Long Term Economic Growth, 1895 to 1943

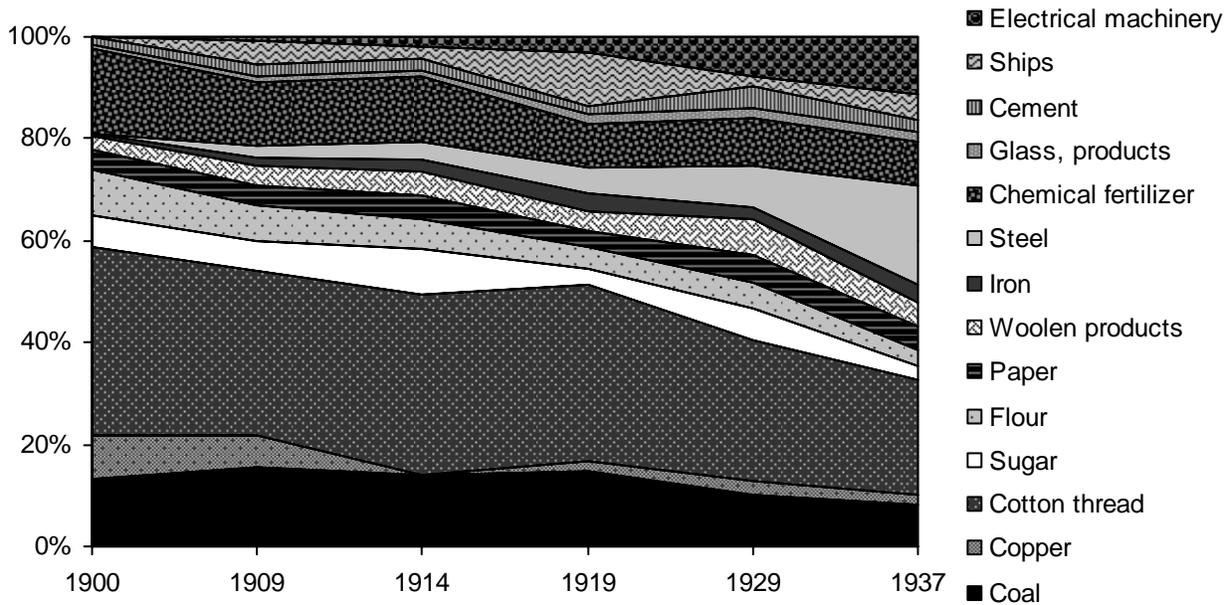
Only real *per capita* Gross National Product (GNP) is available up to 1930, after which real *per capita* Gross Domestic Product (GDP) is reported. The difference is that GDP includes economic activity by foreign firms within Japan, but excludes activity by Japanese firms abroad. GDP is now generally preferred as a measure of economy performance, but was not introduced in most countries until well into the 20th century.



Source: Mitchell (2003).

Figure 6. Japan's Early 20th Century Industrialization

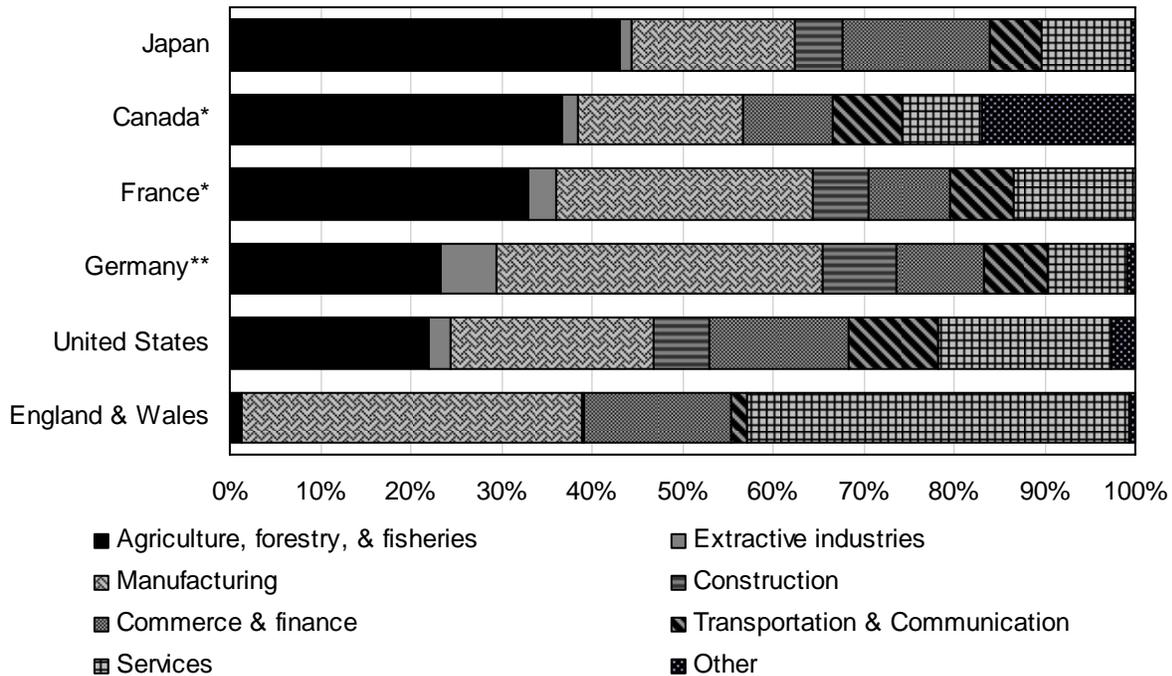
Each industry's production in yen, as percent of total industrial production by largest sectors as of 1937.



Source: Graph based on numbers reported in Miyajima (2004, p.26)

Figure 7. Industrial Structure of the Japanese Economy, 1921

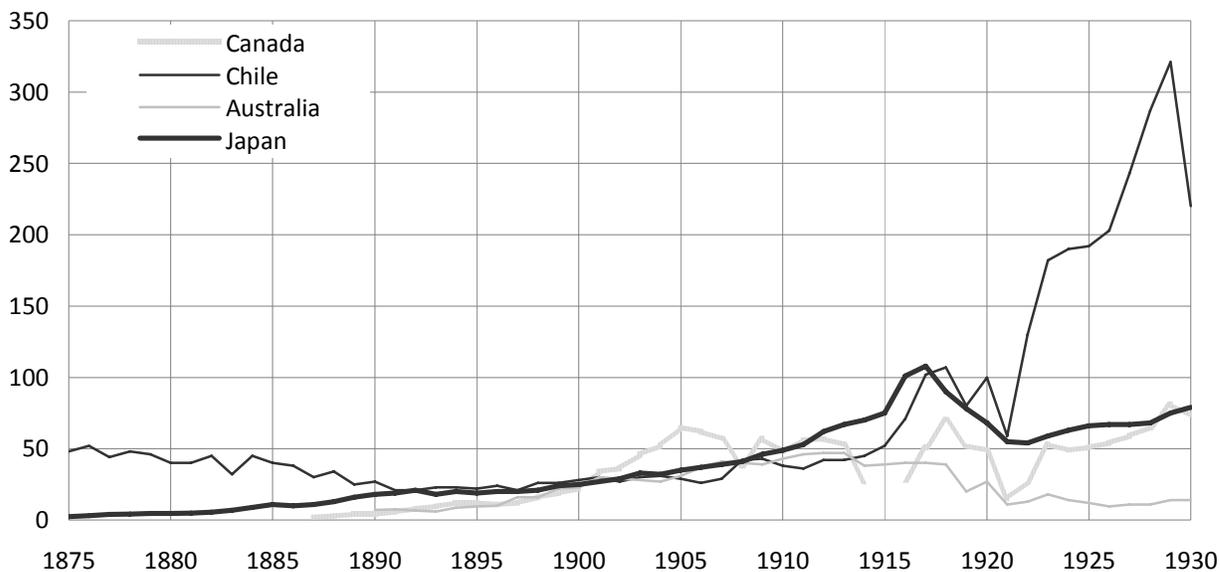
The fraction of the labor force of the Japanese economy employed in each industrial sector is indicated by the shadings in the first bar. For comparison, similar breakdowns are provided for Canada in 1931, France in 1931, Germany in 1925, the United States, and England (including Wales).



Source: Mitchell (2003, 2003a, 2003b, as summarized in Morck and Nakamura (2004)).

Figure 8. Major Copper Producers in the Late 19th and Early 20th Centuries.

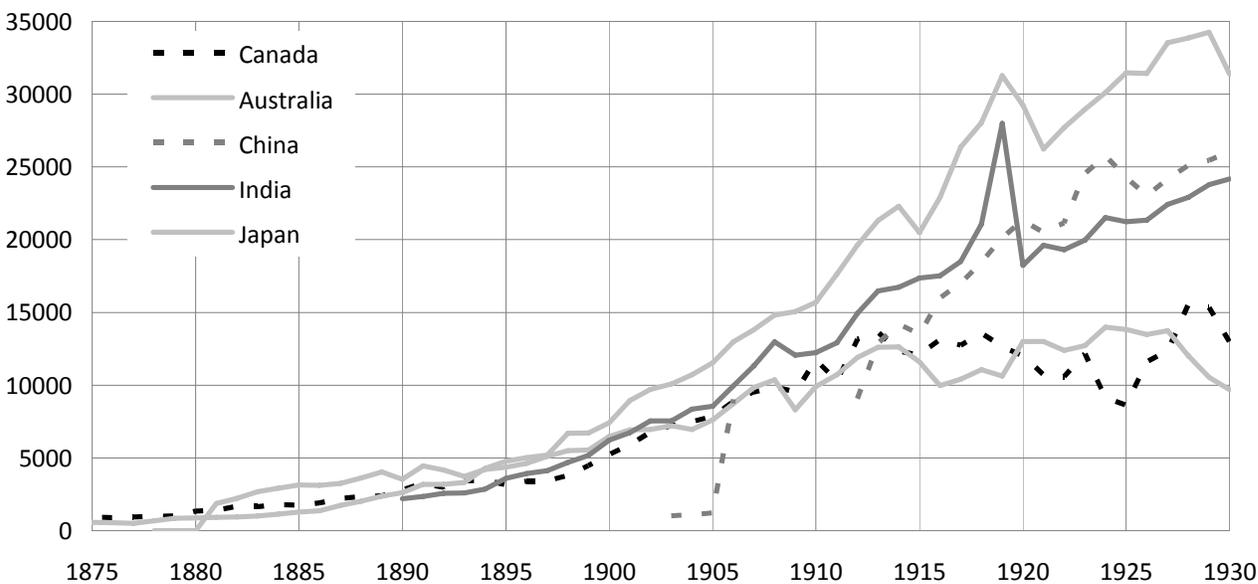
Copper production in thousands of tons per year, by country of origin. The United States (18,000 tons in 1875 rising to 640,000 tons in 1930) and Germany (279,000 tons in 1875, rising to over one million tons per year during the Great War, and falling to only 27,000 tons by 1930) are not shown. The data displayed are for the remaining four of the world's top six producers during this period.



Source: *International Historical Statistics*

Figure 9. Major Coal Producers in the Late 19th and Early 20th Centuries.

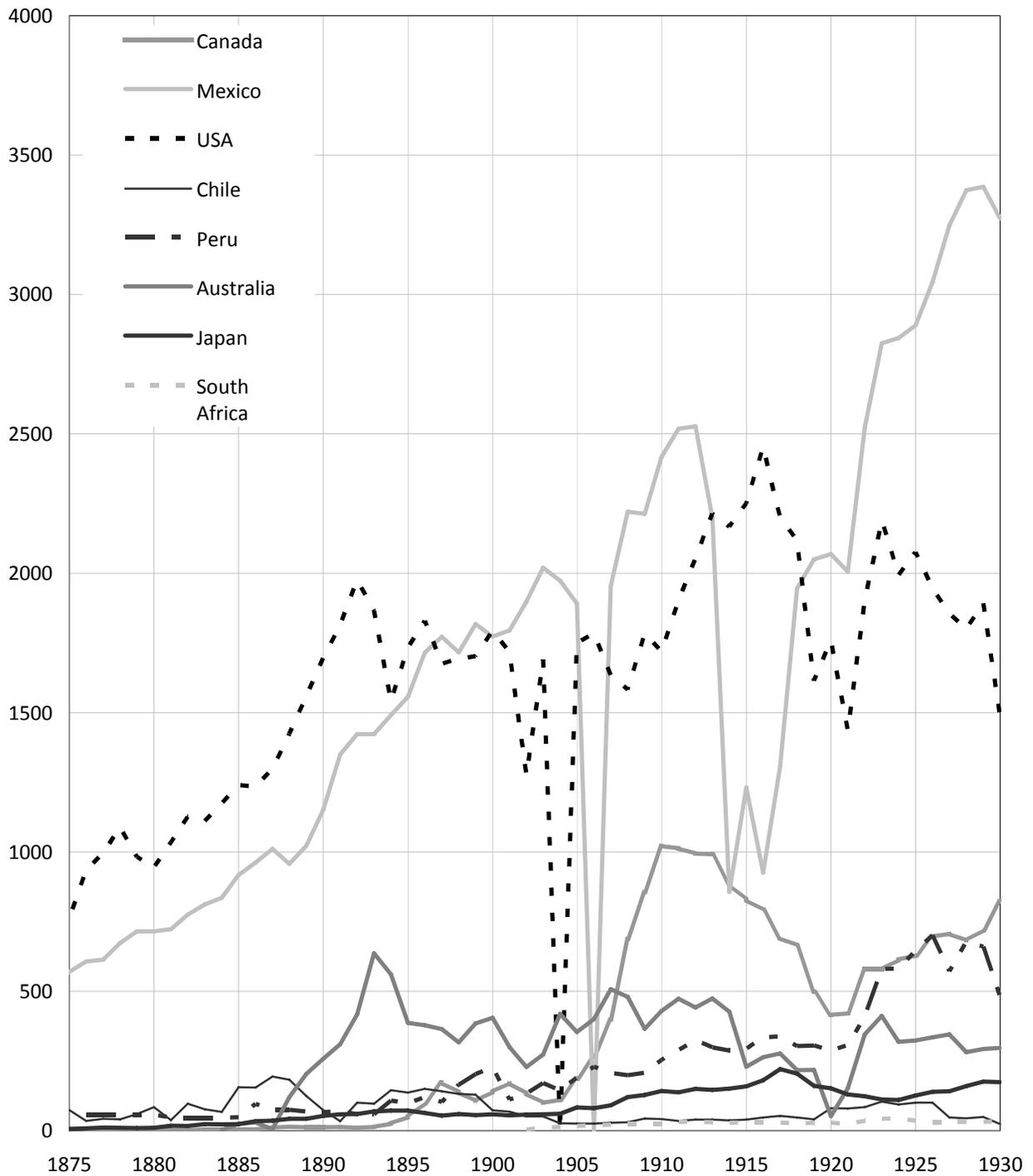
Coal production in thousands of tons per year, by country of origin. The United States (30 million tons in 1875 rising to 424 million tons in 1930) is not shown. The data displayed are for the remaining five of the world's top six producers during this period. Canadian figures combine hard and soft coal.



Source: *International Historical Statistics*

Figure 10. Major Silver Producers in the Late 19th and Early 20th Centuries.

Silver production in thousands of tons per year, by country of origin. The data displayed are for the eight top producers in the world during this period.



Source: *International Historical Statistics*

6.1 A Big Push in Private

The ubiquity of pyramidal business groups in modern day developing economies and in the economic histories of virtually all developed economies suggests an economic purpose.¹¹ Morck and Nakamura (2004) propose that pyramidal business groups arise as a private sector mechanism for coordinating a big push growth strategy. A single controlling shareholder can coordinate the growth of firms across widely divergent industries so that customers and suppliers grow in tandem, subsidizing one firm where this is justified by its importance to the growth opportunities of another. Infusions of public equity throughout business group mobilized savings to realize the increasing returns to scale promised by big push advocates.

The Mitsui and other prominent Tokugawa merchant families were immensely wealthy, but none had the sorts of resources necessary to finance “big push” industrialization. The failed state-led big push of the 1870s led to the mass privatization of the 1880s, which left the country’s major mines controlled by such families, and by a handful of foreign-trained entrepreneurs. This first generation of industrialists used their mines’ revenues to finance industrial ventures. Soon the scale of investment necessary exceeded these revenues, and necessitated the tapping of public equity markets.

But massive public equity financing dilutes initial shareholders’ stakes. This has major costs in a big push, where suppliers, customers, and producers of complementary goods can hold each other up for quasirents, and where the threat of such behavior can deter first movers, and hence development. Moreover, big push growth requires profitable sectors to subsidize necessary sectors forced to operate at inefficient scales. For a private-sector big push to be feasible, Rosenstein-Rodan (1943) rightly notes that we need a “private sector mechanism ... that can simultaneously plan the industrialisation of several complementary industries”.

Centralized control over major operations in not just a few, but numerous different industries evokes central planning, and thus Rosenstein-Rodan’s call for state ownership, or at least state orchestration, of big push development. Japan’s history amply verifies the well known governance problems associated with state-control over business. Rosenstein-Rodan was right about the problem, but wrong about the solution.

The solution he rejects is unitary private-sector control over a similarly broad industry cross-section of large-scale operations. But Meiji Japan is likely typical of developing economies, in that none of its tycoons or merchant families had the resources to construct such a macroeconomically-sized conglomerate. Public shareholders were needed, and they require control rights and a degree of transparency such a macroeconomic conglomerate firm would be hard pressed to provide.

Fortunately, a third solution presented itself – the pyramidal business group. This financial structure, apparently devised by British trading companies earlier in the 19th century, permitted a wealthy family or individual to tap vast amounts of capital from small investors while retaining adequate control over corporate assets grown to vastly more than that family or individual’s own wealth. By the late 19th century, rudimentary groups of this sort were forming in many countries, including Canada, the United States, and many European countries. By the 1920s, these structures would become the dominant form of organization for big businesses throughout the world.

The Japanese term for such a pyramidal business group is *zaibatsu*.¹² Like pyramidal groups elsewhere, *zaibatsu* of this era were multi-tiered structures with a lead business at the apex. This

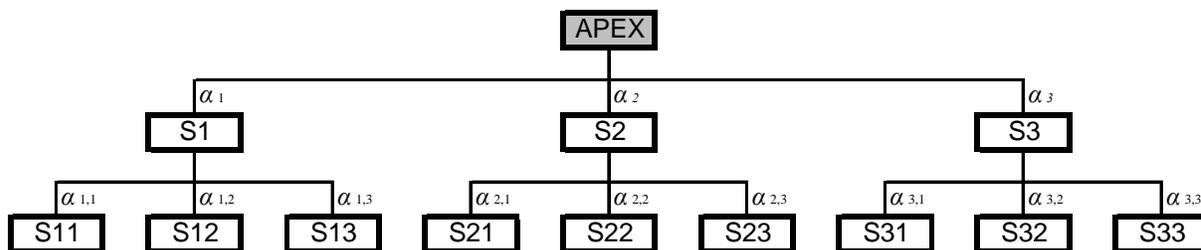
¹¹ This section recapitulates arguments in Morck and Nakamura (2004).

¹² Literally *zaibatsu* (財閥 or ざいばつ means “wealthy group”. Japanese economic and business historians entertain an energetic debate about the precise definition of a *zaibatsu* and when *zaibatsu* first arose. See e.g. Yasuoka (1976). Although Japanese business and economic history literature generally date *zaibatsu* to the period after World War I, the Mitsui, Sumitomo, and Mitsubishi business groups predate that era by many decades and are the models for subsequent *zaibatsu*.

business held equity control blocks directly in each of a lower tier of listed companies. Each of these, in turn, held control blocks in yet other listed firms, composing the next tier down. Each of these, in turn, could hold control blocks in still other listed firms. At each tier, the remaining shares in each firm were owned by small outside shareholders.

Figure 8. A Stylized Pyramidal Business Group

An apex firm, usually controlled by a tycoon or wealthy family, holds fractions α_1 , α_2 , and α_3 of the stock of a first tier of listed subsidiary firms S1, S2, and S3. These each hold equity blocks in member firms of a second tier of listed subsidiaries. In this case, S1 controls S11, S12, and S13 by owning fractions $\alpha_{1,1}$, $\alpha_{1,2}$, and $\alpha_{1,3}$ of their shares, respectively. Additional listed firms and further tiers can be added as needed.



This structure has several obvious advantages.

First, by controlling a single apex firm, the tycoon or wealthy family, can control an essentially limitless number of listed firms. A common controlling shareholder can force cooperative behavior on the executives of these firms, preventing hold up problems. A common controlling shareholder can also orchestrate the intercorporate cross-subsidies needed in a big push. This can be accomplished via *tunneling*, the transfer of wealth between commonly controlled firms via transfer pricing, etc. (Johnson et al. 200X).

This allows for the common control of many firms operating across a broad spectrum of industries. Pyramidal business groups in today’s emerging economies are also extraordinarily widely diversified (Khanna and Yafeh, 2007)

Second, common control over a huge number of firms can be effected with a very limited, albeit substantial, initial fortune. Figure 8 shows this. The apex firm controls 51% of the votes in every first tier firm, and so appoints whomsoever it pleases, usually family members, to their boards. These firms control 51% of each second tier firm, so the latter’s boards are appointed by the boards of the former, who are appointed by the party in control of the apex firm. In this manner, whoever controls the apex firm controls every firm in the pyramidal group.

Thus, the pyramidal business group is financed using primarily using other people’s money. The listed firms in the pyramid’s first tier are 49% financed by outside shareholders. Those in the second tier are 49% directly financed by outside shareholders and 51% financed by first tier firms, which are also 49% financed by outside shareholders. The net result is that second tier firms are 74% financed by outside shareholders. Firms in the third tier are 85.25% financed by outside shareholders, and those in the fourth tier are 92.25% financed by outside shareholders. Lower tier firms are successively more thoroughly financed by public shareholders.¹³ Despite this, every firm is firmly controlled by the controlling shareholder of the apex firm.

¹³ Continuing this example, listed firms in the n^{th} tier are $1 - \alpha^n$ financed by external shareholders, where α , the intercorporate control stake, is 51% in this example. A 51% stake is often unnecessary for effective control if most shareholders fail to vote, the control stake shares have multiple votes, or debt and non-voting preferred shares are

This allow the business group to mobilize public equity capital on a grand scale to finance a big push, yet retain centralized control to effect the coordination needed to make this strategy economically successful.

Third, the retained earnings of existing firms in the group can be used to finance the control equity blocks in new publicly traded firms. The large Japanese zaibatsu typically had vast mining operations – either initially (as with Sumitomo) or obtained in the mass privatization (as with Mitsui, Mitsubishi, and Nissan). These mining interests served as reliable sources of earnings that could provide funding for control stakes in new publicly floated subsidiaries. Natural resources revenues could thus fuel any big push the zaibatsu coordinated. The extent to which pyramidal groups elsewhere are, or were, built around natural resources is unknown.

This means the controlling shareholder need lay out no additional funds of its own, yet still retains full control of new firms created in existing or yet lower tiers of the group. New firms in new industries can be capitalized as needed, without drawing upon the wealth of the controlling shareholder – even for equity control blocks.

Finally, the controlling shareholder is well shielded by limited liability should one of the firms end up in legal difficulties (Almeida and Wolfenzon, 200x). Each firm in the group is separately incorporated and separately listed. Each has a distinct set of shareholders. And the controlling shareholder is shielded by multiple layers of limited liability from legal problems afflicting firms in the pyramid’s lower tiers.

This allows the controlling shareholder, via tunneling, to control the extent to which one firm’s fortunes or misfortunes affect other member firms. A big push requires this sort of centralized discretion over risk sharing.

6.2 Second Best Social Welfare?

A central planner running Rosenstein-Rodan’s (1943) state-led big push would maximize a social welfare function of the form

$$[1] \quad W(t) = \sum_i \omega_i(t) W_i(t)$$

subject to a budget constraint for resources revenue and inter-industry transfers, where the value of industry i at time t is $W_i(t)$ and the weight of industry i in overall social welfare is $\omega_i(t)$.

At a point in time, a pyramidal group’s controlling shareholder would, to a first approximation, maximize the value of the apex firm, V_0 . In Figure 8, this is

$$[2] \quad V_0 = A_0 + \sum_i \alpha_i V_{Si} = A_0 + \sum_i \alpha \left(A_i + \sum_j \alpha_{i,j} V_{Sij} \right)$$

where A_n is the value of the operating assets of firm n , net of transfers to other firms, with $n \in \{\text{apex, s1, s2, s3, s11, s12, ...}\}$. Each firm has market value V_n , and the α are as in Figure 8. This assumes that the value of each firm in the group is the value of its operations plus the value of its investments in its subsidiaries.

This maximization would be subject to a budget constraint for intercorporate transfers, $t_{m,n}$ being wealth transferred from firm m to firm n , of the form

added to the mix. Cross-holdings – shares held by firms not in the level immediately above, but elsewhere in the pyramid – further complicate the arithmetic in real pyramidal groups. See Bebchuk et al. (2000).

$$[3] \quad 0 = \sum_{m,n} t_{m,n}$$

We postulate that an economy in which several tycoons run competing pyramidal groups and are maximizing [2] can approximate the results of maximizing [1] under a set of idealized circumstances. To see this, consider the case of one firm requiring an input from another, but with overall demand for the good insufficient to let the input producer cover its costs.

[To be completed]

6.3 Japanese Exceptionalism

Japan grew rich, but many resource rich countries with huge pyramidal business groups do not. Upon consideration, this is not surprising for several reasons.

First, pyramidal business groups are associated with a host of governance problems. Berle and Means (1932) highlight the stark separation of ownership from control in pyramids, and argue that it induces suboptimal management. Bebchuk et al. (2000) go further, arguing that pyramidal business groups induce uniquely bad governance practices. Presumably, the advantage of big push coordination can compensate for this, under some circumstances at least. But if the big push falters, or goes awry, only the downside is left

Second, controlling a huge constellation of firms, worth vastly more than the controlling shareholder's actual wealth, bestows likewise magnified political and economic power. See Morck and Yeung (2004), Morck (2005), and Morck, Yeung, and Wolfenzon (2005) for a detailed discussion of the immense political influence such groups vest in their controlling shareholders in many countries – both historically and presently. Pyramidal groups might thus reinforce the natural resources curse of Sachs and Warner (200x) by compounding the political economy perils of a natural resource based economy.

We speculate that Japan escaped this fate for three reasons.

First, Japan's traditional feudal elite, its warlords and samurai, were utterly discredited and had negligible influence after the 1870s. Reischauer (1988, pp.81-83) explains

"With the disappearance of the domains, the samurai lost their position as a hereditary bureaucratic class, and in 1873 universal military conscription was substituted for the old class basis for military service. In 1876 the samurai were even prohibited from wearing their swords, their badge of distinction. Samurai stipends were also drastically reduced and by 1876 were entirely commuted into relatively small lump-sum payments of cash or government bonds. Thus the samurai in a brief nine-year period were deprived of all their privileges, and Japan was started on a great change that was to transform its society in a mere generation or two from one in which status was determined primarily by heredity to one in which it depended largely upon the education and achievements of the individual."

Acemoglu, Johnson, and Robinson (2001, 2002, 2005) argue that traditional elites in non-Western societies are typically predisposed to extractive economic activities, such as running large estates or mines; and favor policies that favor these operations and which, perhaps inadvertently, limit the rise of a middle class. Japan's big push perhaps worked because its traditional elite were uniquely marginalized. Cultural preconditions like these may be difficult to replicate elsewhere.

Second, Japan's natural resources based big push succeeded during an era of small government liberalism. The state gave an initial push, and then withdrew. The mass privatization restored public finances, but left politicians fearful of state intervention. Political rent-seeking is a low-return investment if the government is avowedly non-interventionist. This mitigates the government failure problems of Krueger (1974), Murphy et al. (1991, 1993), Easterly (2001, 2006a), and others, which Sachs and Warner (various) link to the natural resources curse.

Third, Japan's abrupt opening to the outside world under Commander Perry's guns was formalized with a sequence of so-called unequal treaties. These made Japan an open economy in a time of global free trade and capital flow. Morck, Stangeland, and Yeung (2000), Rajan and Zingales (2003), Stulz and Williamson (2003) and others link economic openness to sustained financial development in cross-country analyses. Henry (2000, 2000a, 2003) links financial openness to capital investment booms; and Choe and Stulz (1999), Li et al. (2004), and others show that trepidation about financial openness destabilizing markets is misplaced. Morck, Daniels and Wolfenzon and Yeung (2005) survey evidence of elite entrenchment and link it to financial insularity. The *unequal treaties* also empowered foreign courts to apply foreign law to disputes in treaty concession enclaves, thus demonstrating a spectrum of foreign legal systems in action. La Porta et al. (1997) link legal system structure to financial development, suggesting another possible hidden boon in the *unequal treaties*. Japan's big push might also owe its success to these *unequal treaties* and the full ascension to the global economy they forced. This point, along with the preceding one, suggest that so-called "Washington consensus" policies of liberalization and openness are not entirely misguided.

7. Conclusions

The above case studies describe how five of Japan's most important pyramidal groups contributed to its "high-growth period" spanning the late 19th and early 20th centuries. There were other pyramidal business groups, and freestanding firms unaffiliated with any business group as well. But these five, the largest business groups, are clearly implicated in Japan's economic success during this era. They were its star performers, and were instrumental in transforming the country into a modern industrial state by the 1930s. Japan's economic development holds lessons for other countries, just not the ones usually listed.

1. Japan shows that natural resources wealth can finance a "big push" (Rosenstein-Rodan, 1943; Sachs 2005; Murphy, Shleifer, and Vishny, 1989). Despite allegations to the contrary, 19th century Japan was richly blessed with natural resource wealth. The records of its government and business groups testify that revenues from their minerals and coal mines financed the country's industrialization efforts – first an unsuccessful state-led "big push" and then a successful privately-led "big push". The Meiji Restoration took place in 1868, and by the end of World War I Japan was an industrial economy on a par with many countries. By World War II, Japan was an industrial behemoth capable of defeating Tsarist Russia, conquering much of Asia, and giving the Western democracies a run for their money.
2. Japan shows that the state cannot easily direct a natural resources-fueled "big push" growth. Rosenstein-Rodan (1943) misguaged the government failure problems associated with empowering public officials with the economic authority necessary to direct a "big push"; and Easterly (2006), Sachs and Warner (various), and others correctly stress how government failure can sabotage a natural resources financed "big push".

Japan's unsuccessful 1870s sought to use state-controlled mines to capitalize ranks of SOEs to build an entire economy of modern industrial production facilities *de novo* and *en masse*. Soft budget constraints (actually the total lack of budget constraints) quickly all but bankrupted the state. To rescue the country from fiscal and monetary crisis, the Meiji Finance

Minister, Masayoshi Matsukata slashed subsidies and organized a mass privatization. Their fingers thus burnt, government officials largely kept their hands off the business sector until the military takeover of the 1930s. Japan's state-led "big push" attempt, despite its failure in its avowed goal, nonetheless served the nation well by ushering in a few decades of laissez-faire.

3. Japan shows that the private sector – shielded from government intervention by a commitment to laissez-faire, openness, etc. – can finance and coordinate a "big push" (Morck and Nakamura, 2004). The mass privatization left key SOEs in the hands of a few wealthy families – the Mitsui, Sumitomo, and Iwaski (Mitsubishi) or tycoons (Nissan). These then tapped public equity to assemble vast pyramidal groups of firms, spanning many interdependent industries. Coordinating the growth of the member firms of these groups to maximize their personal wealth, each family or tycoon effectively mounted a privately-led "big push" to achieve the results Rosenstein-Rodan (1943) hoped for from a state directed big push.

While our argument differs from other proposed economic roles for pyramidal business groups, it in no way discredits them. Hoshi, Kashyap and Scharfstein (1990, 1991) argue that business group firms coinsure each other to spread risk; and Khanna and Palepu (2001), Khanna and Rivkin (2001), Khanna and Fisman (2004) and others argue that business group firms can trust each other and do business in economies where arm's length dealing is stymied by pervasive corruption. We accept all of these proposals as potentially valid, but also propose that they can be unified under the rubric of a natural resources-financed "big push" led by tycoons or wealthy families, who use pyramidal business group structure to direct national savings into a coordinated centrally (and privately) planned development program across diverse industries.

Our argument thus supports the view that a centrally coordinated "big push" can accelerate development (Rosenstein-Rodan, 1943; Sachs 2005; Murphy, Shleifer, and Vishny, 1989), but echoes our earlier work (Morck and Nakamura, 2004) in arguing that very large pyramidal business groups can, potentially at least, perform this coordination role better than governments. Our arguments are also broadly consistent with work on the natural resources curse (Sachs and Warner, various), and with the view that limitations on the returns to political rent-seeking and openness can exorcise this curse.

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