The rise and fall of Japanese economy in super long waves of capitalist world system

Nobuharu Yokokawa (Musashi University)

Introduction

After the financial crisis of 2007–2008 we are facing the beginning of the end of the postwar capitalist world system. Once I called the 1920s an interregnum when the old hegemon Britain lost economic and military power to organize capitalist world system and the potential new hegemon the USA did not have will to create a new capitalist world system. It was a period of discontinuity in social orderaccompanied by widespread unrest, wars, and power vacuums. It continued threedecades before a new capitalist world system was established by the USA. On the other hand an interregnum is a most important period to create a more stable and egalitarian world system. In this paper I will follow long and super long waves of capitalist economy, and examine the rise and fall of Japanese economy to find the requirements for more stable and egalitarian economic development.

In the first section, long waves and super long waves are examined. Long waves are stages of development in a capitalist world system. They are explained by the shift ofdynamic industries and corresponding capital accumulation regime (or “techno-economic paradigm” Perez 2003). A capital accumulation regime with new dynamic industries followsformation, development, maturity, and then structural crisis. The structural crisis of acapital accumulation regime is a creative destruction from the view point of new dynamic industries.Super long waves are explained by the shifts of capitalist world systems. The first capitalist world system was created by Britain in the early 19th century. It followed three stages of development: mercantilism, liberalism, and imperialism. They are the stage of formation of the capitalist world system, that of establishment and that ofdiversification.The stage of diversification (imperialism)was that of the formation of a new capitalist world system, Bureaucratic Capitalism. It was created by the USA, andalso followed the stage of establishment (the golden age) and then that of diversification (neoliberalism).

In the second section I build a new flying geese theory incorporating dynamic comparative advantage theory and financial instability hypothesis with Akamatsu’s flying geese theory (Akamatsu 1962). The new flying geese theory enables to analyze both linear (catch-up) and non-linear (uneven) industrialization, vertical specialization, changes in the leaders of dynamic industries, and national economic growth strategies with capital flows (Yokokawa 2016).

In the third section, I follow flying geese pattern of industrialization and the rise of Japanese economy after World War II (Yokokawa 2013).In the golden age after World War II,Japan shifted its dynamic industry from textile to heavy and chemical industries. The upgrading of Japanese industries left room for less-developed East Asian countries to industrialize in the flying geese pattern.After the structural crisis of the 1970s,Japan shifted its dynamic industries to machinery industries such as automobiles and

electrical machinery, and Asian NIEs shifted their dynamic industries to heavy and chemical industrieswith export-led growth strategies. The Japanese car industry improved productivity by introducing integral product architecture.It was very effective, and quality and productivity in automobile and electronic machinery industries improved significantly.

In the fourth section I examine open product architectureand the fall of Japanese economy.Facing declining international competitiveness, US encouraged joint R and D based on consortia of firms to develop industry-wide consensus standard in the 1980s. In the standardized open area implicit knowledge and know how were revealed and became explicit where competition reduced value added per labour (VAL). In the protected closed area that required high technology existing companies could enjoy high value added. This inequality of the VAL distribution between open and closed areas led to a drastic change in the division of international labour. In the 1990s US platform leaders successfully encapsulated their core technology into chipsets with built-in software.Platform leaders supplied core chipsets to companies in emerging world, which made assembly makers in developing countries to produce quality products easier and more competitive. Design and production makers in advanced countries are losing competitiveness to the combination of platform leaders and assembly makers in developing countries. It is not Japanese integral product architecture in machinery industries but the combination of closed and open product architecture in ITC and knowledge intensive industries that has become a new dynamic industry.

In theconclusion I speculate the possibility to create a new production-led capital accumulation regime. Information and communication technology with built-in software and internet has high possibility to increase productivity.I argue that in order to create a new golden age with a production-led accumulation regime solving demand constraint is required. Firstly, Inequality in distribution of VAL between closed and open areas must be resolved. Secondly, inequality in distribution of VAL between wages and profits must be reduced. Thirdly, stable international monetary system such as Keynes' International Clearing Union must be created (Keynes 1980).

1. Long waves and super long waves of Capitalist economy

Dynamic industries and Long Waves

Long waves (Perez 2003) may be better explained using the concepts of dynamic industries. In dynamic industries clusters of innovations accelerate productivity growth, whichfollows an S shaped logistic curve.Their productivities are measured by value-added per labour (VAL).

VAL= the volume of product x value-added per product

When a new capital accumulation regime is created to accommodate new dynamic industries, they become leading industries in the new capital accumulation regime. Figure 1 shows that in dynamic industries (such as automobile) the volume of product increases with productivity growth. The value added per unit of product is large when a new product is exclusively supplied by a limited number of

firms. When a new technology spreads, the price of a product becomes cheaper, and value-added per product is reduced. The result is a bell shaped VAL curve that shows dynamic industry's VAL increases with the increase in productivity and eventually decreases.

Fig.1 Value added per labour

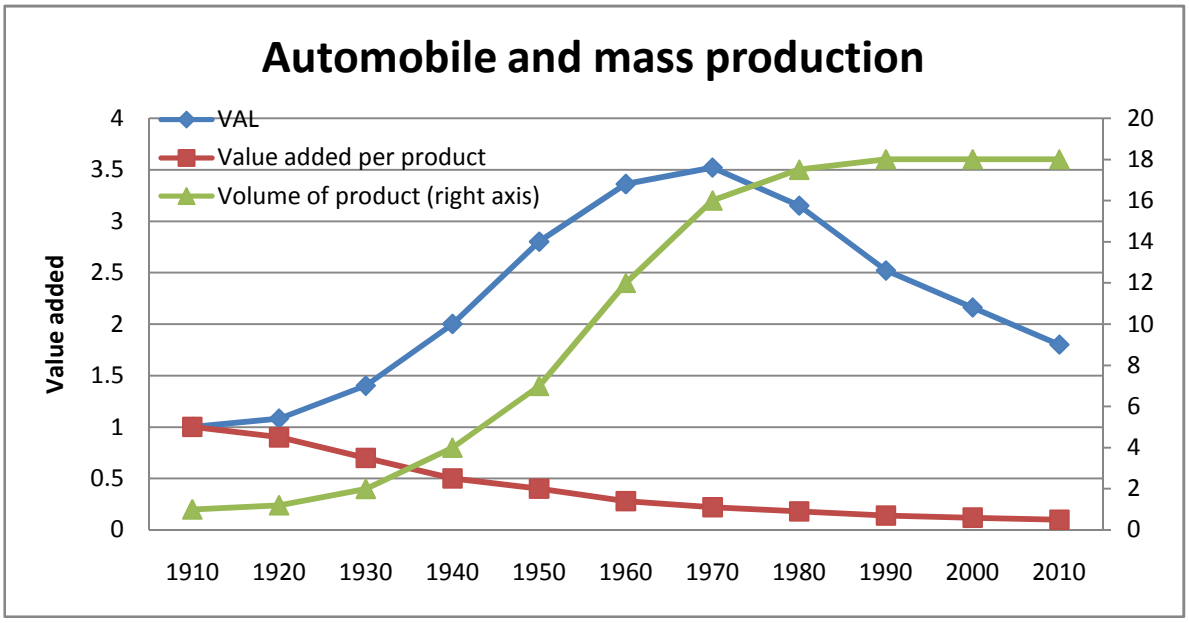


Figure 2 shows that dynamic comparative advantage depends on the difference between VAL and wages. With increasing VAL dynamic comparative advantage increases in the first half of a long wave.Historically wages increased in proportion to average productivity.With decreasing VAL and rising wages dynamic comparative advantage eventually declines. This causes serious structural crises which destroys existing capital accumulation regimes.

Fig. 2 Dynamic comparative advantage

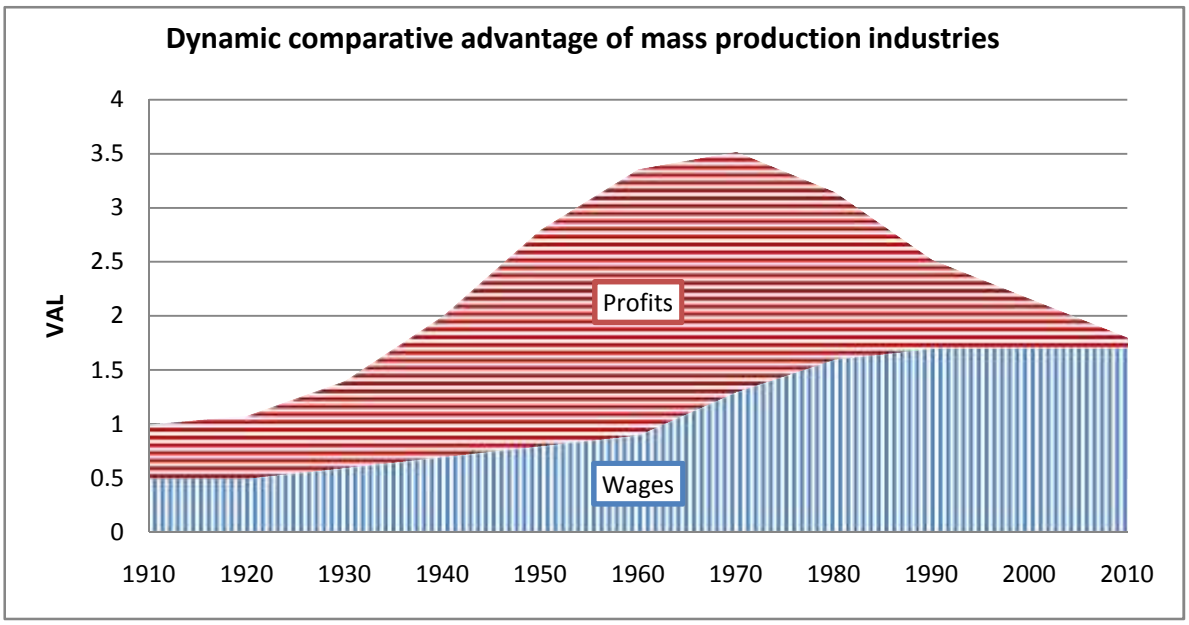
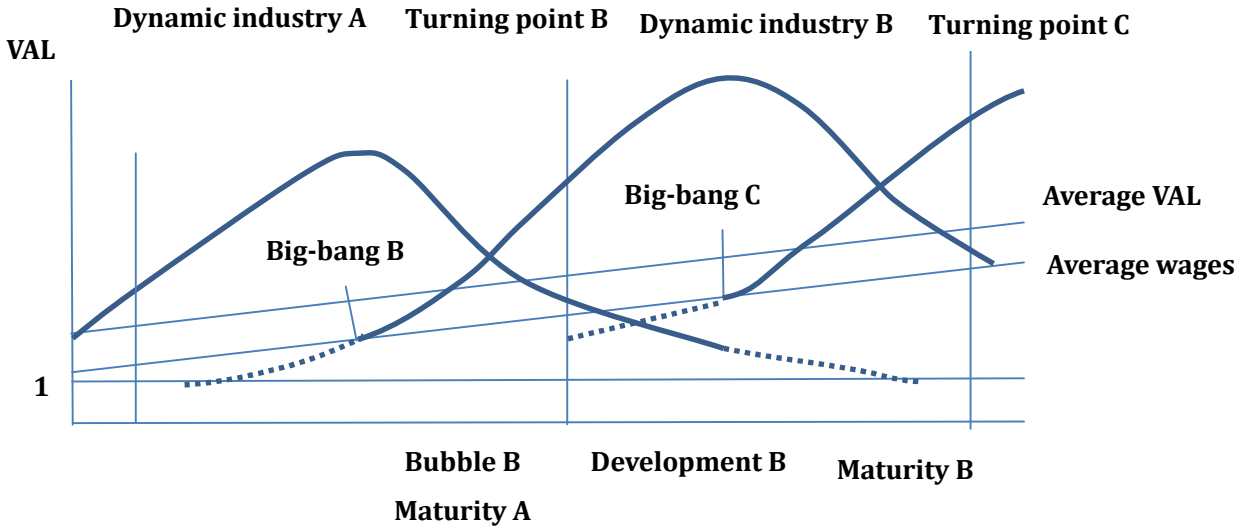


Figure 3 shows long waves of capitalist economy. It shows that maturity of the old dynamic industry, and big-bang and bubble of the new dynamic industry overlap, and that the structural crisis of the old capital accumulation regime is creative destruction from the view point of a new dynamic industry (Yokokawa 2016).

Fig. 3Dynamic industries and long waves



Long and Super long waves

Fig. 4 Long waves and super long waves

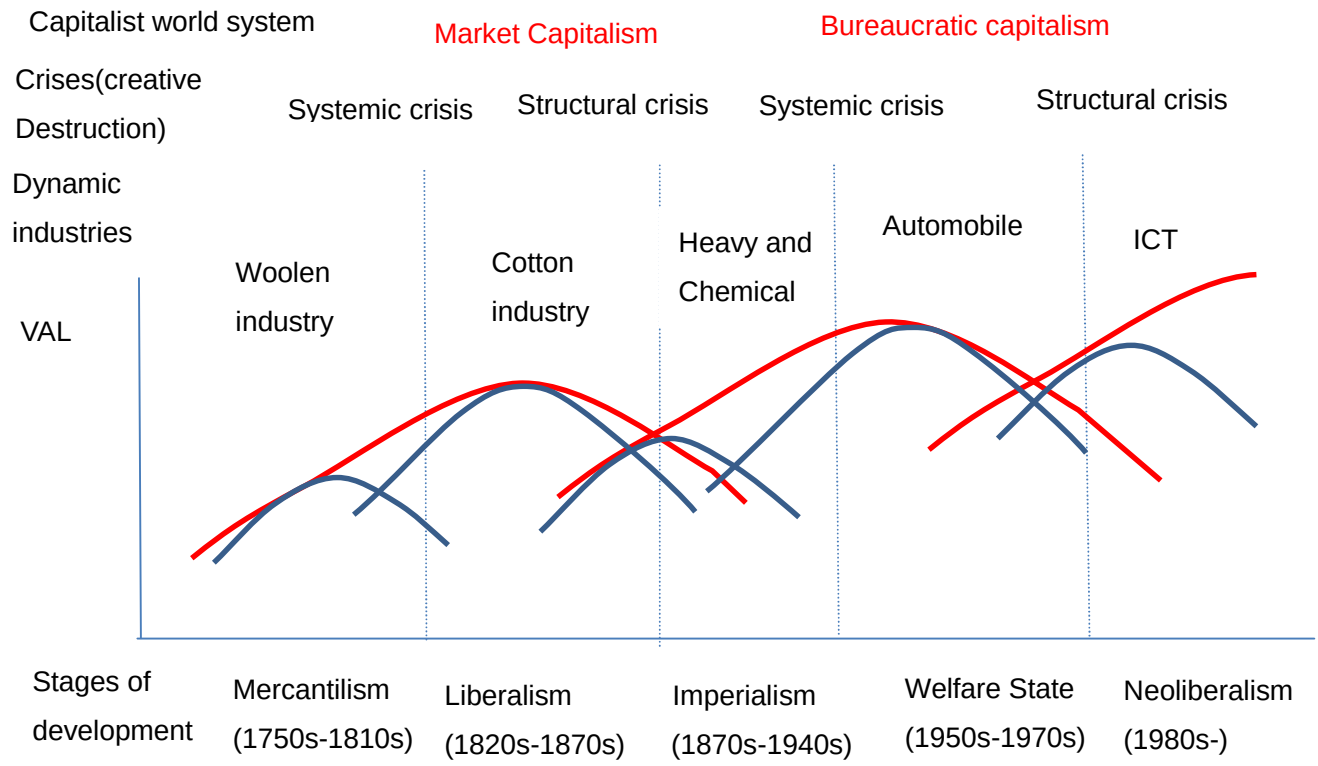


Figure 4 shows that 5 long waves and 2 super long waveshave been observed in capitalist economy.The first capitalist world system, market capitalism, was established when Britain created a production-led economy in the early 19th century with cotton and railway industries as the dynamic industries (Fig. 4 and Table 1). The dynamic comparative advantages of British cotton and railway industries were fully developed in this capital accumulation regime with foreign demand as the engine of demand growth. This created the first golden age of capitalism. After the structural crisis in the late 19th century, the locus of dynamism shifted to heavy and chemical industries, and the centers of economic growth shifted from the UK to the US and Germany (diversification). A new capital accumulation regime, imperialism, was created with two challengers and one old hegemon. It was a demand constrained and "finance-led economy" where the financial system expanded to encompass longer term capital credit, and investment bankers dominated financial markets. Bankers controlled industrial capital. Minsky (1992, p. 109) wrote "bankers were aware that cut-throat competition was hazardous to the health of their clients . . . They sought to protect the cash flows that the firm they financed generated by forming trusts, cartels and monopolies". The structural crisis in the US in 1929 took a form of the systemic crisis of finance. It developed into the systemic crisis of the market capitalism in the 1930s. The systemic crisis of a capitalist world system, such as the great depression in the 1930s is the most serious crisis that abolishes not only the capital accumulation regime but also the current capitalist world system.

The periods of diversification and systemic crisis of market capitalism overlapped the formation period of a new capitalist world system (Fig. 4 and Table 1).

Table 1 Capitalist world system and stages of development

World system	Stages of development	Core countries	Dynamic industries	Financial Regime
Formation	Mercantilism (1750s-1810s)	Britain overtaking continent	Industrial Revolution	
Establishment	Liberalism (1820s-1870s)	Britain spreading to continent and US	Cotton, steam and Railways	Commercial capitalism (Production-led)
Diversification	Imperialism (1880s-1940s)	USA and Germany overtaking Britain	Steel, electricity, and Chemical	Finance capitalism (Finance-led)
Establishment	Welfare State (1950s-1970s)	USA spreading to Europe and Japan	Automobile and Mass Production	Managerial capitalism (Production-led)
Diversification	Neoliberalism (1980s-)	Asiaovertaking USA and Europe?	Information and communication	Money manager capitalism (Finance-led)

After World War II, bureaucratic capitalism was established when the US created a production-led economy with the mass production system of machinery industries as the dynamic industry. Minsky

(1992) gives three causes for the reestablishment of a production-led economy. Firstly, government intervention in the market reduced the bankers' role. Secondly, investment was mainly financed by internal reserve. Thirdly, management control was established which reduced the power of shareholders.

The dynamic comparative advantage of the mass production system was fully developed in this production-led capital accumulation regime with wages as the engine of demand growth. This created the second golden age of capitalism.

After the structural crisis in the 1970s, the locus of dynamism shifted to Information and communication, and the centers of economic growth shifted from the US and Europe to Asia.Neoliberalism (1980s-)is a demand constrained and finance-led economy. Minsky (1992) emphasized the parasitic character of the new finance-led economy: "unlike the earlier epoch of finance capitalism, the emphasis was not upon the capitalist development of the economy but rather upon the quick turn of the speculator, upon trading profits".The structural crisis ofneoliberalism since 2007 may develop into systemic crisis.

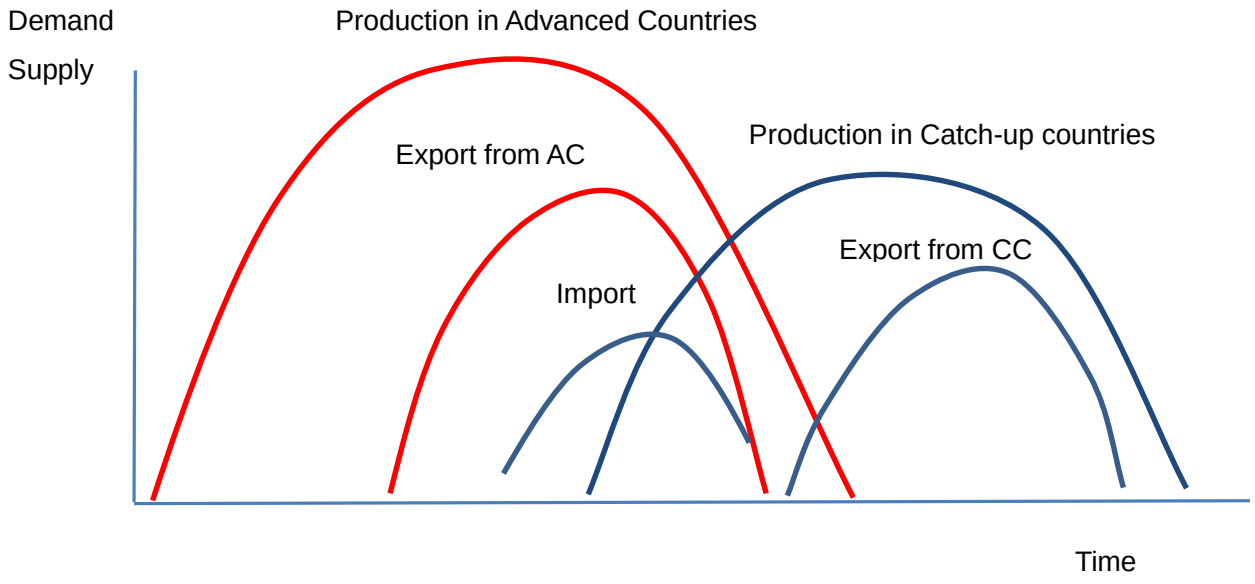
2. The new flying geese theory and Reemergence of Asia

The new flying geese theory

Industrialization in East Asia has been studied in the framework of Akamatsu's flying geese theory (Akamatsu 1962), which is a proto-dynamic comparative advantage theory and the most original framework for the analysis of East Asian industrialization (Yokokawa 2013). The theory of dynamic comparative advantage complements Akamatsu's flying geese theory, and creates a new flying geese theory (Yokokawa 2016).

The first thesis

Fig. 5 Flying geese pattern I

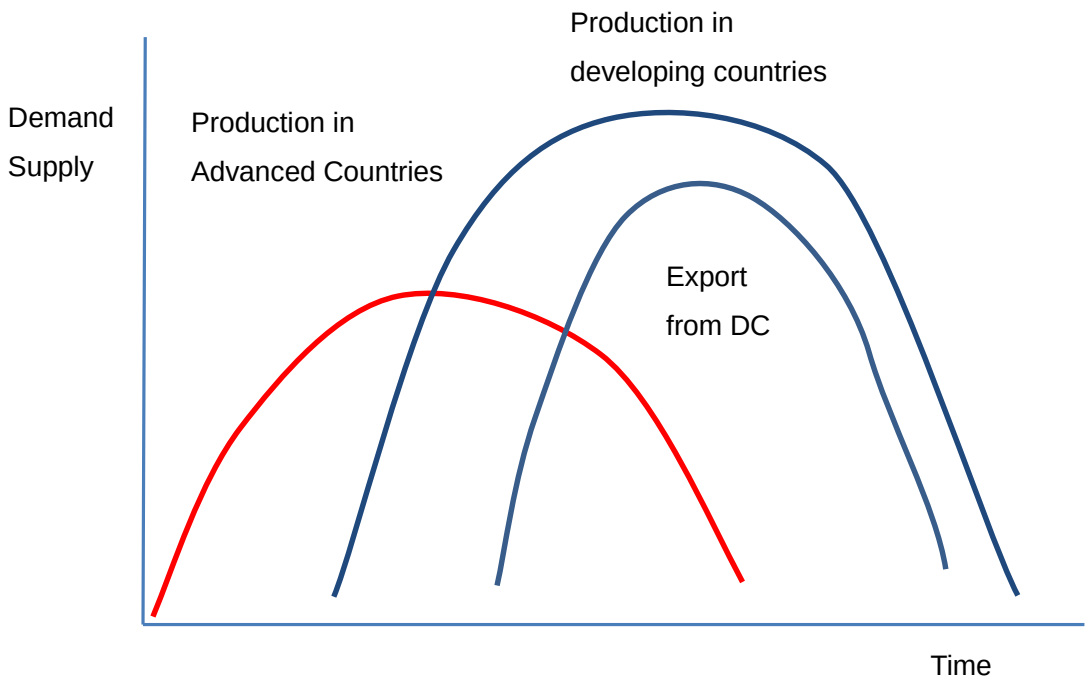


The new flying geese theory examines capitalist development from the point of view of the most

advanced country as in the case of Vernon's product cycle theory (Vernon 1966). Figure 5 shows the flying geese pattern I. (1) A dynamic industry is first developed in advanced countries. Demand for its products develops in advanced countries. (2) As the dynamic industry develops in advanced countries VAL increases. Production expands to achieve economies of scale, and exports begin. (3) With the further spread of production the VAL falls. Decreasing dynamic comparative advantage forces reductions in domestic production, and production moves to less-developed countries with lower wages. (4) Finally, the foreign-produced commodity is imported.

In the new theory it is expanded to explain vertical specialization. Figure 5a shows the flying pattern I with vertical specialization. (1) The platform of a dynamic industry is developed in advanced countries. (2) Production in open area moves to less-developed countries and the VAL in open area falls. (3) Decreasing dynamic comparative advantage in advanced countries forces reductions in domestic production. Their imports of the foreign-produced commodity increase.

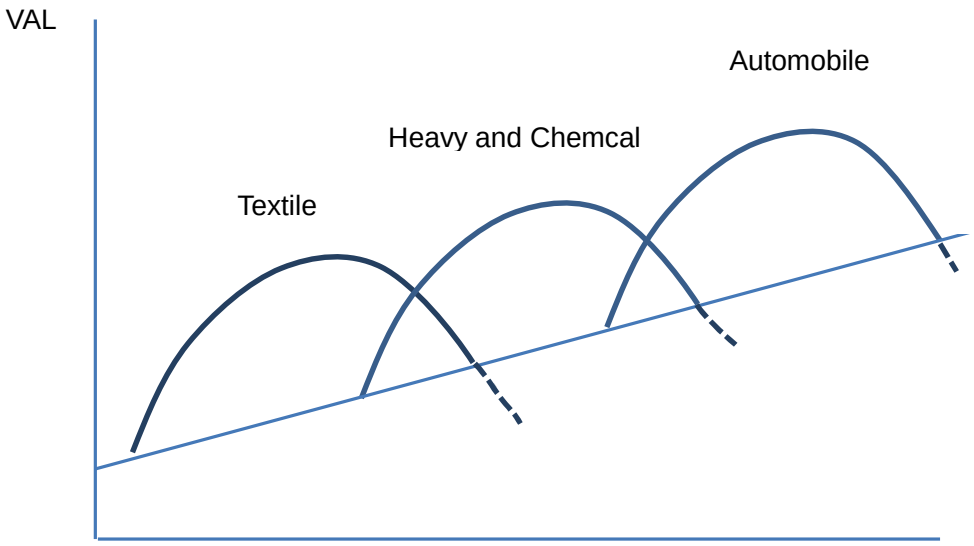
Fig. 5a Flying geese pattern I with vertical specialization



The second thesis

Figure 6 shows that dynamic industries shift to more sophisticated products or industries when existing dynamic comparative advantages are lost.

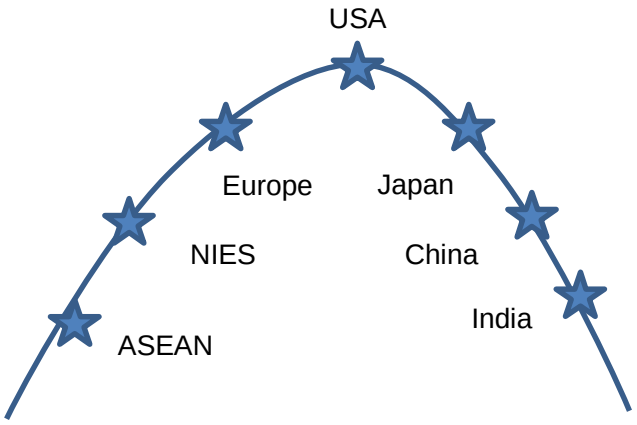
Fig. 6 Flying geese pattern II



The third thesis

Figure 7 shows “Development of advanced and less-advanced countries in a wild-geese-flying pattern” (Akamatsu 1962).

Fig. 7 Flying geese pattern III



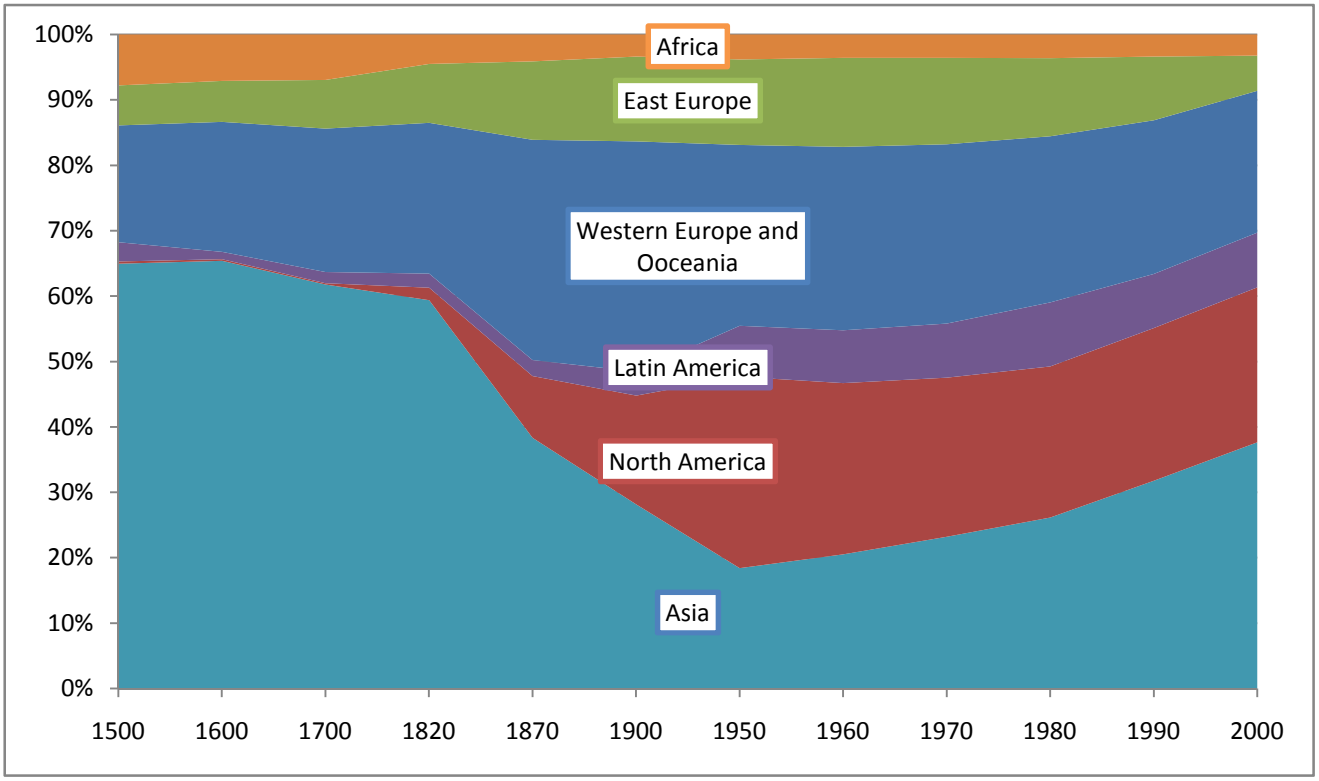
In its original form, the flying geese theory does not cover uneven development (Akamatsu 1962). In the new flying geese theory changes in the leaders of dynamic industries such as from Britain to the USA and Germany at the end of the 19th century, are explained by the uneven development and the strategies adopted by the countries when they face structural crises in a capital accumulation regime (Yokokawa 2013).The new flying geese theory is adaptable to many types of economic development.3 patterns of industrialization may be identified:(1) flying geese pattern industrialization such as the East Asia; (2) premature de-industrialization as in some countries of Latin America; (3) and service

drivengrowth path such as India.We will show that both second and third cases must be change to the first case to achieve the genuine structural change. (Rowthorn 2013, Ghosh 2016)

Reemergence of Asia

Asia's world share of the GDP including India was 60% in 1820, which fell to 15% in 1950 ((Fig. 8, Maddison 2007). It is now growing to 35% and may return to 60% by the latter half of this century at the cost of Europe and the North America[1].

Fig. 8 World GDP share PPP (1500-2001)



Source: Maddison 2007

Japanese GDP share amongselected Asiancountries was 37.3% in 1991, then decreased to 11.5%in 2014 (Fig. 9), and in the world 8.8% and 4.4% respectively(Fig. 10). Chinese share was 18.7% in 1991, then increase to 47% in 2014(Fig. 9), and in the world 4.4% and16.6% respectively (Fig.10). Figure 9 and 10 show that Japanese economic growth peaked in 1991, and the center of economic growthin Asia shifted to China and India in the 2000s.

[1]Most of longer term GDP data use PPP exchange rates which are based on prices of a basket of average consumption goods. They greatly overstate incomes in poorer countries with low average wages. Compare Fig 9 and Fig 9a.

Fig. 9 GDP shares of selected Asian countries PPP (1980-2014)

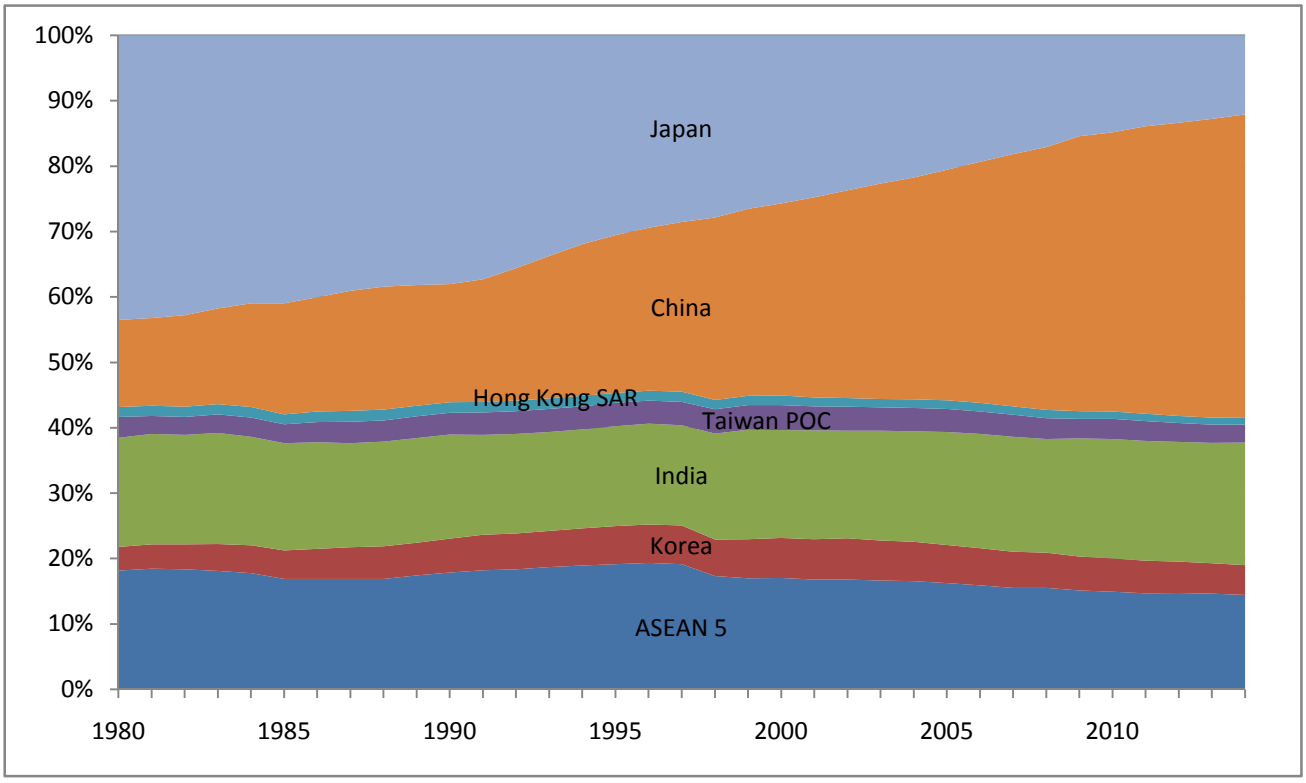
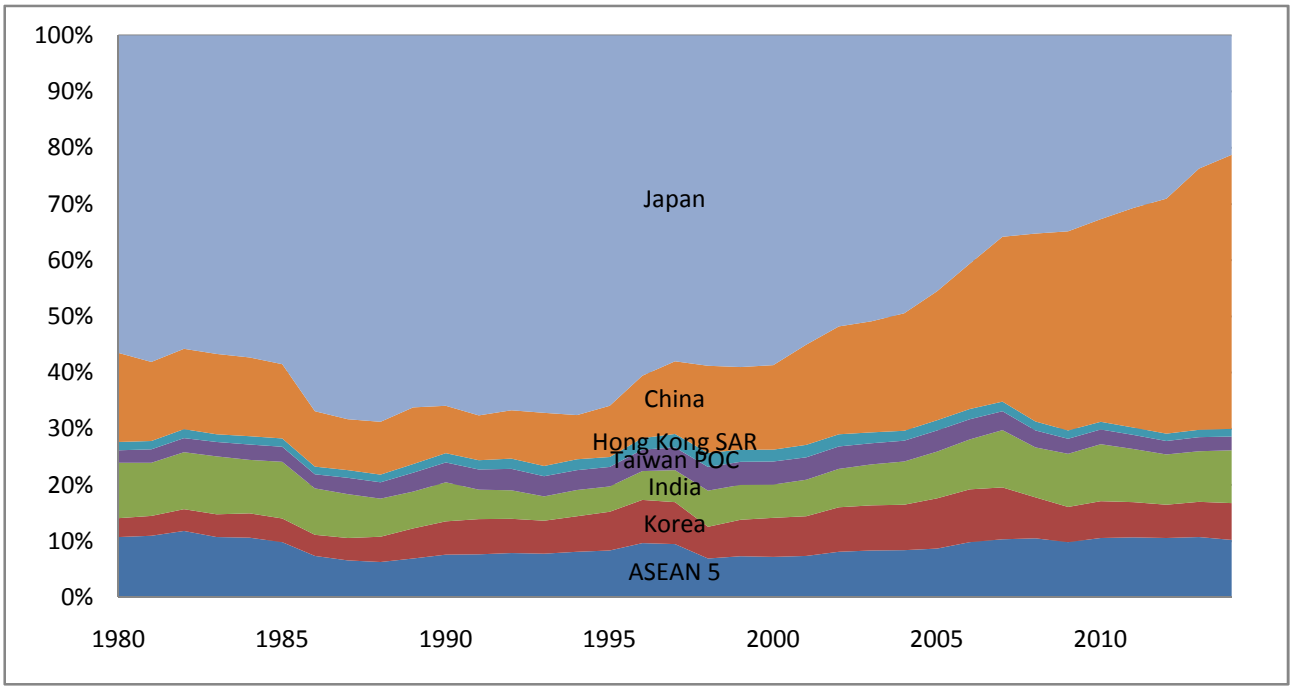
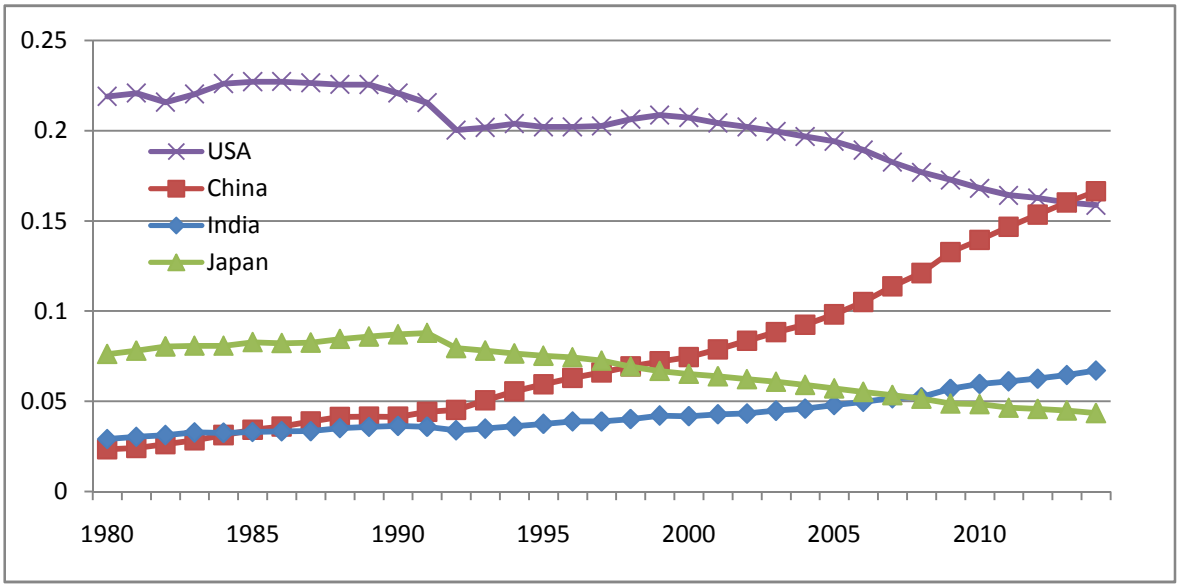


Fig. 9a GDP shares of selected Asian Countries in current US$ (1980-2014)



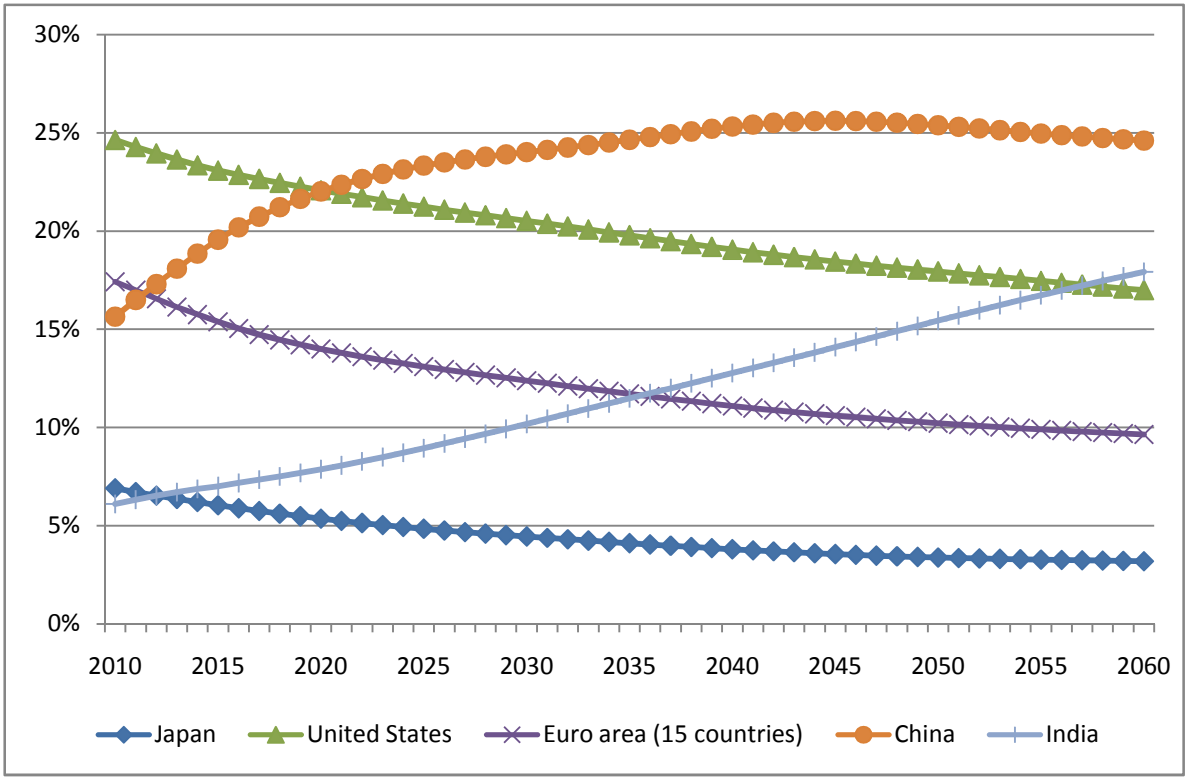
Source: IMF WEO

Fig. 10 World GDP share PPP (1980-2014)



Source: IMF, WEO

Fig. 11 Share of World GDP at 2005 PPP (2010-2060)



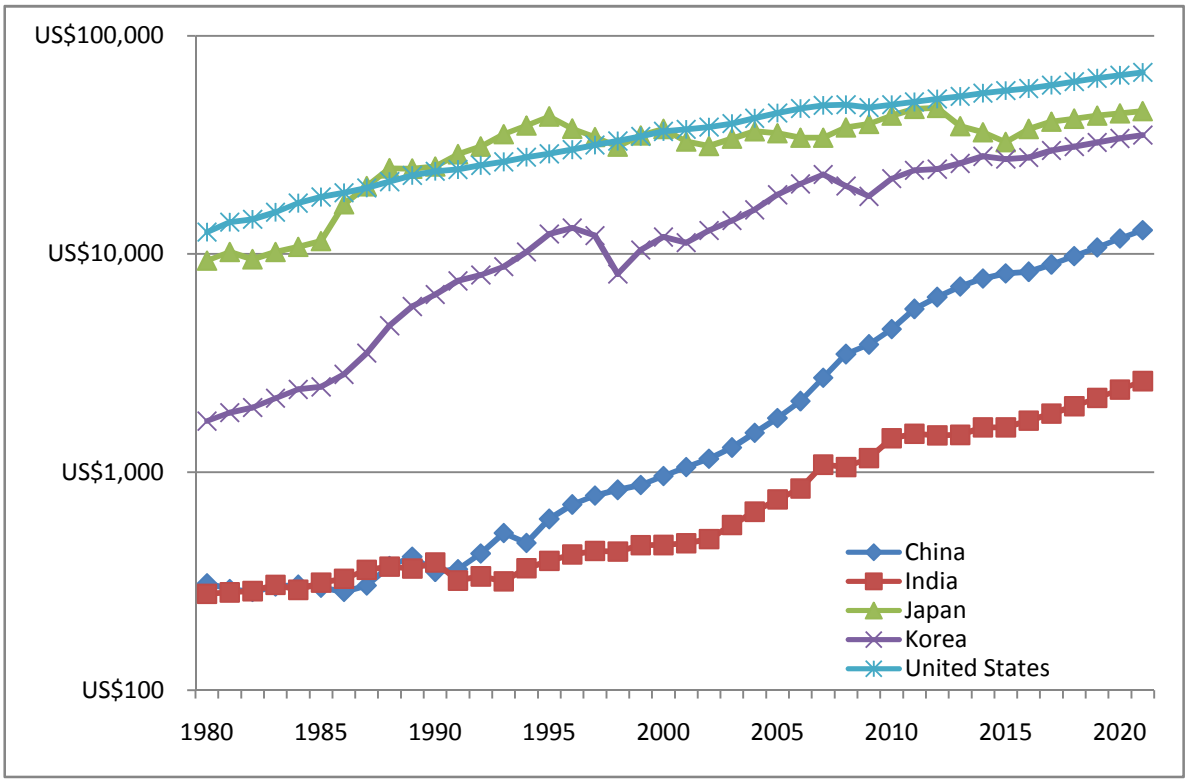
Source: OECD (2014)

OECD (2014) “Long-term baseline projections” projected by the latter half of this century Japanese world share will be 3.2% while Chinese share 24.6% (Fig. 11). Rowthorn (2016, p. 199) commented “It is interesting how small the projected shares of Japan, Indonesia (3.8%) and the two BRIC countries, Brazil (2.8%) and Russia (2.4%) are. . . . The major players will be China, India (17.9%), the USA (17.0%), and

the Euro-area (9.6%)" (parentheses are GDP share in 2060 added by Yokokawa).

Conversion of VAL by catch-up industrialization

Fig. 12 Conversion of GDP per capita current US$ (1980-2020)



Source: IMF, WEO

Figure 12 shows that reemergence of Asia has started reconversion of VAL among advanced and developing countries.

In order to find the relation between industrialization and conversion of VAL, it is useful to decompose growth of per capita income into three factors following Aoki (2011). (1) demographic factors such as increases of working age population and labour participation rate. (2)structural change such as increasing employment in secondly and tertiary sectors reducing that in primary sector. (3) increasing VAL in secondly and tertiary sectors[2].

[2]Decomposition is made as follows:

$$y = \frac{Y}{N} = \left(\frac{E}{N}\right)\left[\left(\frac{E_A}{E}\right)\left(\frac{Y_A}{E_A}\right) + \left(\frac{E_I}{E}\right)\left(\frac{Y_I}{E_I}\right)\right] = \left(\frac{E}{N}\right)(1-\alpha)\left(\frac{Y_I}{E_I}\right)$$

where Y=GDP, N=population, E=total employment, Y_A=output in primary sector, Y_I = output in secondly and tertiary sectors, E_A=employment in primary sector, E_I = employment in secondly and tertiary sectors. α is the employment share of primary sector ($\alpha = \frac{E_A}{E}$).β is productivity differential between primary and other sectors ($\beta = 1 - \left(\frac{Y_A}{E_A}\right)\left(\frac{E_I}{Y_I}\right)$).Let$(1-\alpha\beta) = S$, which means impacts of structural effects. The rate of

Table 2 Contributions of demographic factors (D), structural change(S), and VAL

	Japan			Korea			China		
	D	S	VAL	D	S	VAL	D	S	VAL
1950s	**1.43**	**2.34**	**2.54**						
1960s	0.091	0.98	**6.24**				0.76	0.58	0.77
1970s	-0.41	0.62	**3.59**	**2.22**	**2.29**	**3.29**	0.28	**1.65**	0.28
1980s	0.23	0.40	**3.18**	**1.60**	**2.27**	**4.74**	**1.44**	**3.47**	**3.21**
1990s	0.10	0.28	0.53	0.51	0.11	**4.86**	0.03	1.07	**8.39**
2000s	-0.34	0.10	**1.93**	1.22	0.11	**3.28**	0.30	1.60	**7.41**

Source: derived from Aoki 2011, however periodization is approximate

Table 1 shows the following:

(1) Contributions by demographic factors are quite large in thebeginning of industrialization (population bonus). Once industrialization is completed this factor becomes smaller or even negative.

(2) Contribution by the structural changecan be quite large in thebeginning of industrialization, since employment in the secondary and tertiarysectors increasessifting employment from primary sector to more productive secondly and tertiary sectors.Once industrialization is completed it becomes minimal.(3) The increase ofVAL in second and tertiary sectors is the main source of growth once industrialization is completed. In the catch-up period, it is exceptionally large because of the gains to be had from emulating the dynamic industries of the advanced countries.

These results show that genuine structural transformation of an economy requires industrialisation, and that this remains a necessary stage that cannot simply be bypassed.

3. The rise and fall of the Golden Age

After World War II bureaucratic capitalism successfully established the mutually reinforcing mechanism between productivity growth and demand growth with strong support from the state and international institutions, resulting in the long-lasting high rate capital accumulation of the 1950s-1960s (Yokokawa 2012).

In the US the locus of dynamism shifted from heavy and chemical industries to machine and electrical industries in the 1920s and 1930s. The US mass production system in machine and electrical industries known as “Fordism” was established in the early 1950s and introduced into Europe in the 1950s and 1960s.

In this production-led capital accumulation regime wages increased in proportion to increase of

---

growth of GDP per capita is decomposed as follows. $\Delta y = \Delta\left(\frac{E}{N}\right) + \Delta S + \Delta(\frac{Y_i}{E_i})$

productivity, which enabled for demand to grow in proportion to supply. Ghosh noted that “without generating synergies that rely on the interaction between domestic production and consumption, it is impossible to have virtuous cycles of expansion that also allow for continuous productivity increases.” (Ghosh 2016, p. 296)

The long-lasting high rate capital accumulation in advanced countries itself made further accumulation difficult in the 1970s.

It eventually reduced productivity growth in dynamic industries. First, “Fordism” reached the saturation stage in many advanced countries by the early 1970s. In Europe the scope for catch-up with US productivity levels had declined. Second, part of the productivity slowdown stemmed from slower output growth in industries characterized by economies of scalereflecting instability of economies (Glyn 2006). Third, the relative backwardness of productivity growth in the service sector forced de-industrialization (Rowthorn and Wells, 1987). Productivity growth in the service sector was difficult with available technology. On the other hand, diffusion of technology increased competition both domestically and internationally, and reduced the price of products and value-added. As the result VAL of dynamic industries was reduced.

Long-lasting capital accumulation eventually exhausted the available industrial reserve army in advanced countries. With the over-accumulation of capital relative to available labour, labour unions became militant, and wage bargaining changed from Keynesian with sticky money wages to Marxist with sticky real wages. Large wage increases in the dynamic sectors spilled over into the lagging sectors, and were mostly passed on to consumers in the form of higher prices, which further increased wages under Marxist wage bargaining with sticky real wages.

Increases in wages under a declining VAL reduced the dynamic comparative advantage. When demand for higher real wages surpassed limping VAL growth, wage pressure contributed to a squeeze on profitability. The USA and Europe suffered from a structural crisis of the mass production system in the 1970s.

After the structural crisis of the 1970s the Anglo-Americanneoliberal accumulation regime reshaped the capitalist world system. Neoliberalism shares the four characteristics with Imperialism.

(1) Demand constraints: Neoliberalism destroyed the link between wages and productivity growth. Wages were the engine of demand growth in the Golden Age.

(2) Finance-led economy:neoliberal financial relaxation was introduced to solve demand constraints in advanced countries. It includes regulatory capture such as Wall Street’s lobbying efforts to decrease regulations, regulatory relapse such as memory loss regarding the lessons of the great depression, and regulatory escape such as the shadow banking system, derivatives, options, home equity loans, and securitization and tranching of securities (Palley, 2010).

(3) Globalization: Advanced countries transferred industries which had lost their dynamic comparative

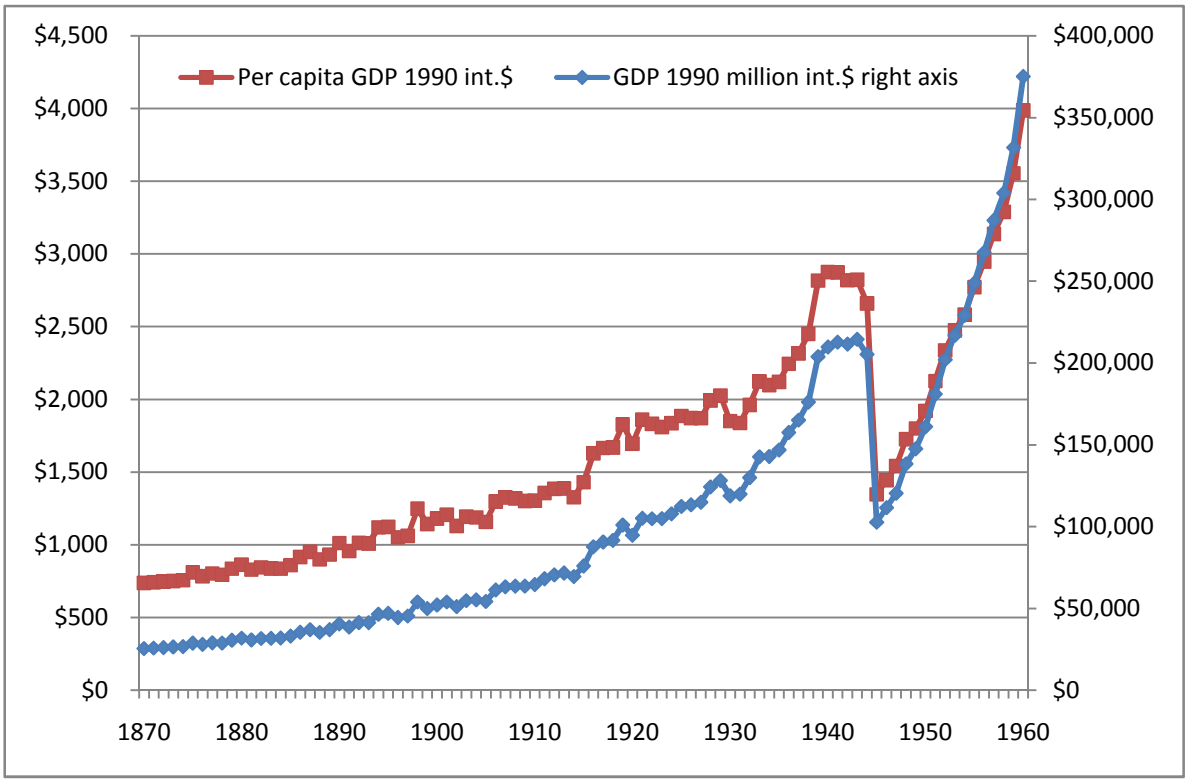
advantage to countries with low wages.

(4) Diversification: The center of economic growth shifted from the USA and Europe to Asia.

4. Flying geese pattern industrialization in Asia

Japanese flying gees Pattern industrialization

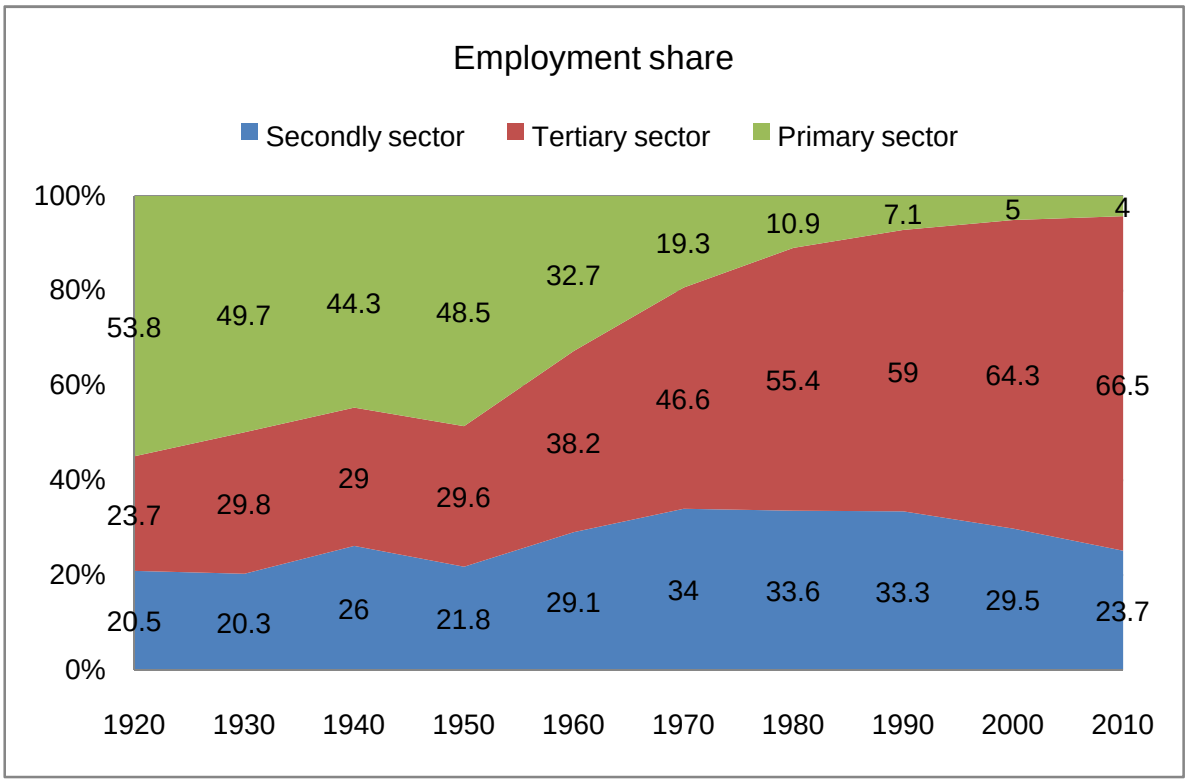
Fig.13 Japanese GDP (1870-1960)



Source: Maddison 2007

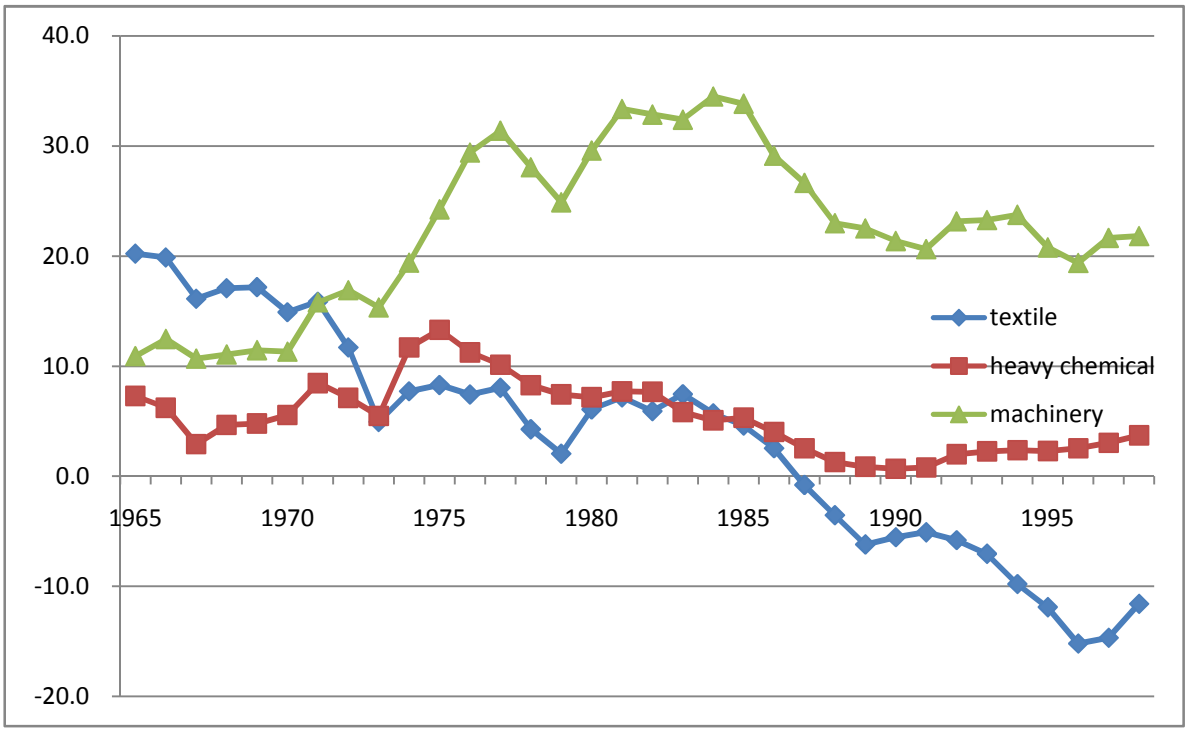
Japanese GDP dropped half from 1940 (210 billion US dollar) to 1950 (161 billion US dollar) because of the distraction by World War II (Fig. 13). Employment share in secondly sector also dropped from 26% in 1940 to 22% in 1950, increasing that of primary sector from 44% to 49% respectively (Fig. 14). Reindustrialization started in the 1950s. Contributions to per capita GDP growth by demographic factors are quite large in the 1950s (1.43%).Contribution by the structural change is quite large in the 1950s (2.34%) and 60s (0.98%) sifting employment from primary sector to more productive secondly and tertiary sectors (Table 2).

Fig. 14 Japanese employment share (1920-2010)



Source: Nihon Kokusei Zue 2013.

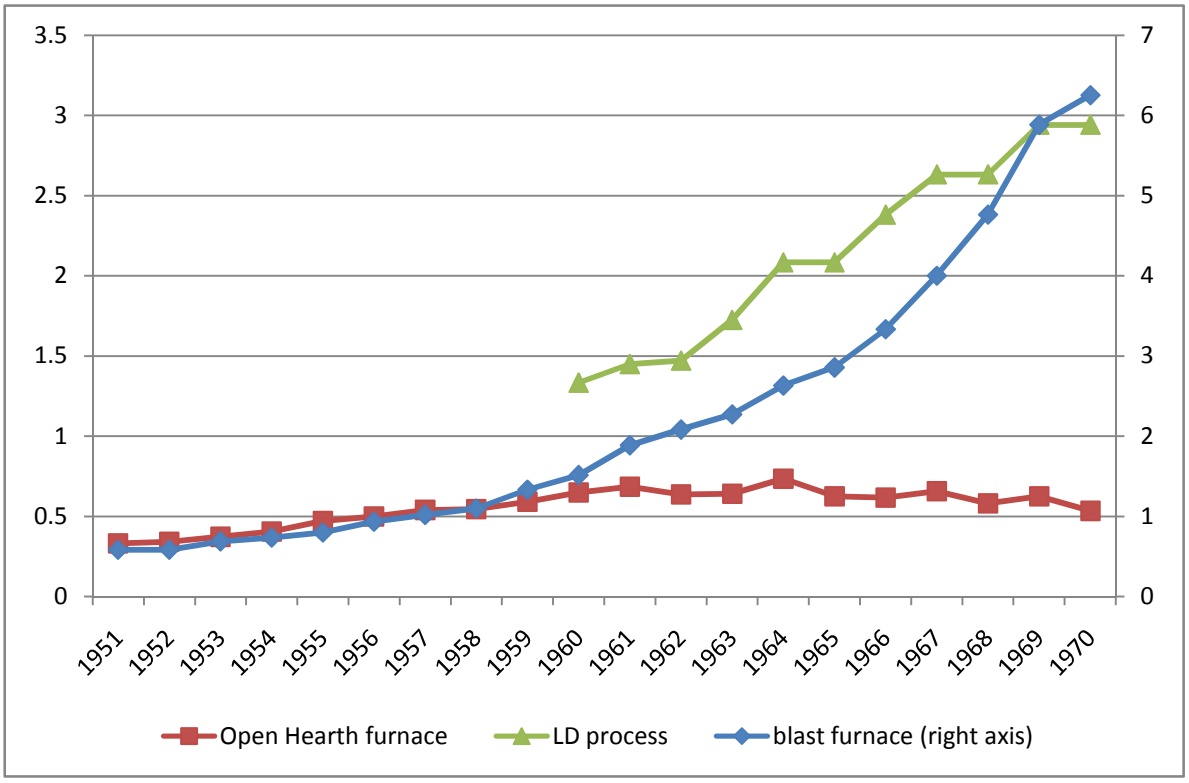
Fig. 15Flying geese pattern II: Export competitiveness of Japanese industries (1965-1998)



Export Competitiveness = (Production/Domestic Demand) – 1

Source: MITI (2001)

Fig. 16Labour productivity of iron and steel industry (1951-1970)



Labour productivity=ton/labour

Source: Ministry of Labour (quoted from Yoshikawa 2012)

Japan shifted its dynamic industry from textile to heavy and chemical industries in the 1950s and the 1960s. Japanese export competitiveness of textile industry peaked in the 1960s.Figure 16 shows that labour productivity of blast furnace (pig iron)increased 6 times, and Introduction ofLinz-Donawitz process (steel) increased productivitymore than 5 times compared conventional open hearth furnace in the 1960s, making Japanese iron and steel industry most efficient in the world.

Japan lost dynamic comparative advantage in the heavy and chemical industries, and itsexport competitiveness peaked in the 1970s (Fig. 15). Japan shifted its dynamic industries successfully to mass production methods in machinery industries, such as automobiles and electrical machinery, from the mid-1970s onwards (Fig. 15). When Japan shifted its dynamic industry to automobile industry in the 1970s, the industry had already reached maturity in the USA and Europe. The Japanese car industry improved productivity by introducing the integral product architecture. Fujimoto (2014) defines it as follows. “Each component is functionally incomplete and interdependent with other components functionally and/or structurally. Designs of the components tend to be specific to each variation of the total system. For each product, components have to be optimized with the other component designs by mutual adjustment”.

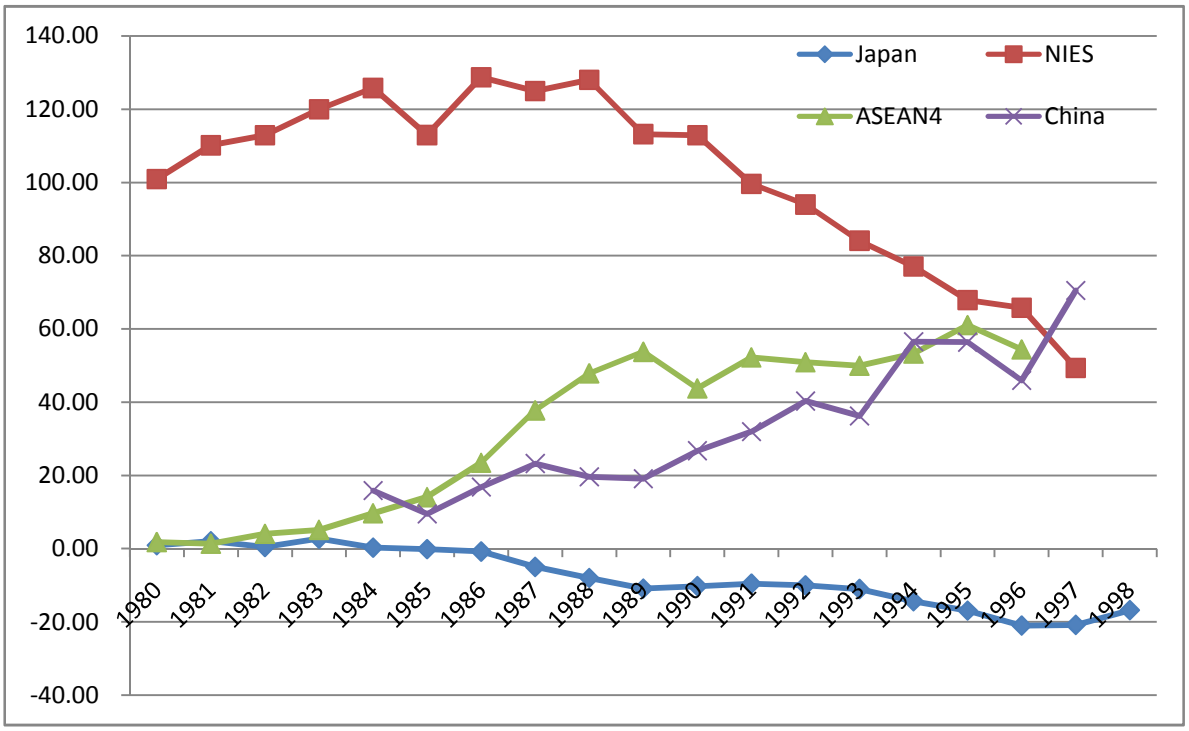
The integral product architecture has strong complementarity with Japanese management system, which include institutionalized incentives to develop contextual skills; systems of centralized personnel administration; subcontracting systems through which diverse components are efficiently supplied (just in

time system) and through which subcontractors cooperate closely with prime contracting firms in product development. Integral product architecture, such as Toyotism, was very effective, and quality and productivity of Japanese design and production makers in automobile and other electronic machinery industries improved significantly in the 1980s.

Flying geese pattern industrialization in Asia

The upgrading of Japanese industries left room for less-developed East Asian countries to industrialize in the flying geese pattern (Fig. 17).Figure 17 shows that export competitiveness of textile industry peaked in the 1980s in Asian NIES. The upgrading of Japanese industries left room for Asian NIEs to promote heavy and chemical industries and other more sophisticated industries. It enabled ASEAN 4 then China to industrialize in textile industries in the flying geese pattern.

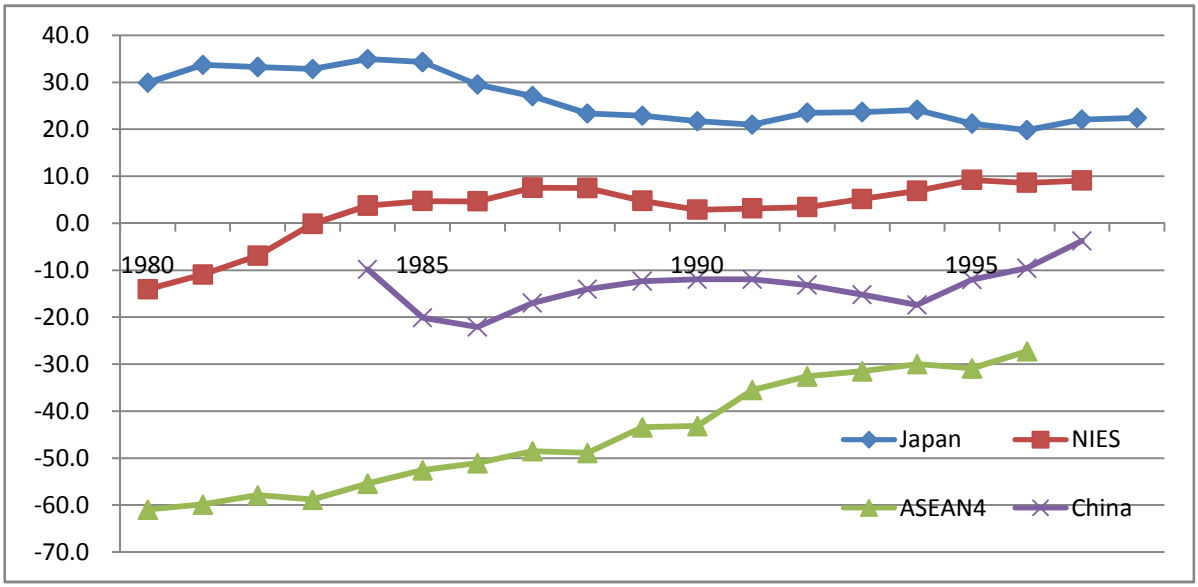
Fig. 17flying geese pattern III: Textile export competitiveness in Asian countries (1980-1997)



Source: MITI 2001

Figure 18 shows that export competitiveness of machinery industries in Japan peaked in the 1980s, while it increased in NIES because of the gains from emulation and lower wages.

Fig. 18Flying geese pattern III: Machinery Export competitiveness in Asian countries (1980-1997)



Source: MITI 2001

Japan and NIES's export-led growth strategies were hugely successful in the first half of the 1980s. The total current account surpluses of Japan, Korea and Taiwan were more than 50 percent of the world's combined surplus. After the Plaza accord of 1985, these countries' currencies appreciated rapidly which triggered structural changes of their accumulation regimes. Firstly, they increased foreign direct investment initially to ASEAN4 (i.e. Indonesia, Malaysia, Philippines, and Thailand) and then to China to reallocate less sophisticated industries. Secondly, they changed export-led growth strategy to domestic demand-led growth strategy. Korea and Taiwan established the link between wages and productivity growth to make wages as the engine of demand growth, while Japan adoptedneoliberal financial relaxation to increase domestic demand (Yokokawa 2013).

5. Open architecture and platform leaders

Open architecture

In the US the locus of dynamism shifted from mass-production system to information and communication technology (ICT) and knowledge intensive industries in the 1980s. Facing declining international competitiveness in manufacturing, US encouraged joint R and D based on consortia of firms to develop industry-wide consensus standard (Tatsumoto et al 2010). In consensus standardization, multiple firms built consensus and set industry-wide standard in a cooperative manner.In the standardized open area implicit knowledge and know how were revealed and became explicit (Tatsumoto et al 2010).It enabled new companies to compete with existing companies under the same conditions in the standardized open area.Fujimoto (2014) defines this product architecture as open architecture: "*Open architecture* is a type of modular architecture, in which 'mix and match' of component designs is technically and commercially feasible not only within a firm but also across firms."

Fierce price competition reduced VAL in the open area, while in the protected closed area that required high technology existing companies could enjoy high VAL. This change in the distribution of VAL led to a drastic change in the division of international labour, and madevertical specialization in global value chain possible. Firms in advanced countries specialized in closed area differentiating products by technological accumulation and implicit knowledge, while firms in emerging countries welcomed open area with detailed standardization as a good opportunity for industrialization.

Platform leaders and vertical specialization

The combination of closed and open product architecture has strong complementarity with ICT and knowledge intensive industries. In the US, the platform business in the closed area has been most successful. The platform is composed of a core componentand other peripheries with standardized interfaces. In the 1990s US platform leaders successfully encapsulated their core technology with chipsets, and then supplied this platform to companies in emerging world.

It made assembly makers in developing countries to produce quality products easier and more competitive. Design and production makers in advanced countries are losing competitiveness to the combination of platform leaders and assembly makers in developing countries. For example design and production makers in personal computer such as IBM, Compaq, and Hewlett-Packard are losing competitiveness to the combination of Intel and assembly makers in developing countries (such as Quanta, Compal, Inventec, and other Chinese makers); in LCD TV, Sharp, Panasonic, and Sony are losing their competitiveness to the combinations of chipsets makers (Genesis Microchip, Pixelworks, and Philips) and assembly makers in Korea, Taiwan, and China; and in mobile phone Nokia is losing its competitiveness to the combinations of chipset makers (Texas Instruments, Infineon Technologies, and MediaTek) and assembly makers in Korea, Taiwan, and China (Suehiro 2014). It is not Japanese integral product architecture in machinery industries but US open product architecture with core chipsets in ICT and knowledge intensive industries that has become a new dynamic industry.

A China-centric Asian production network in the 2000s

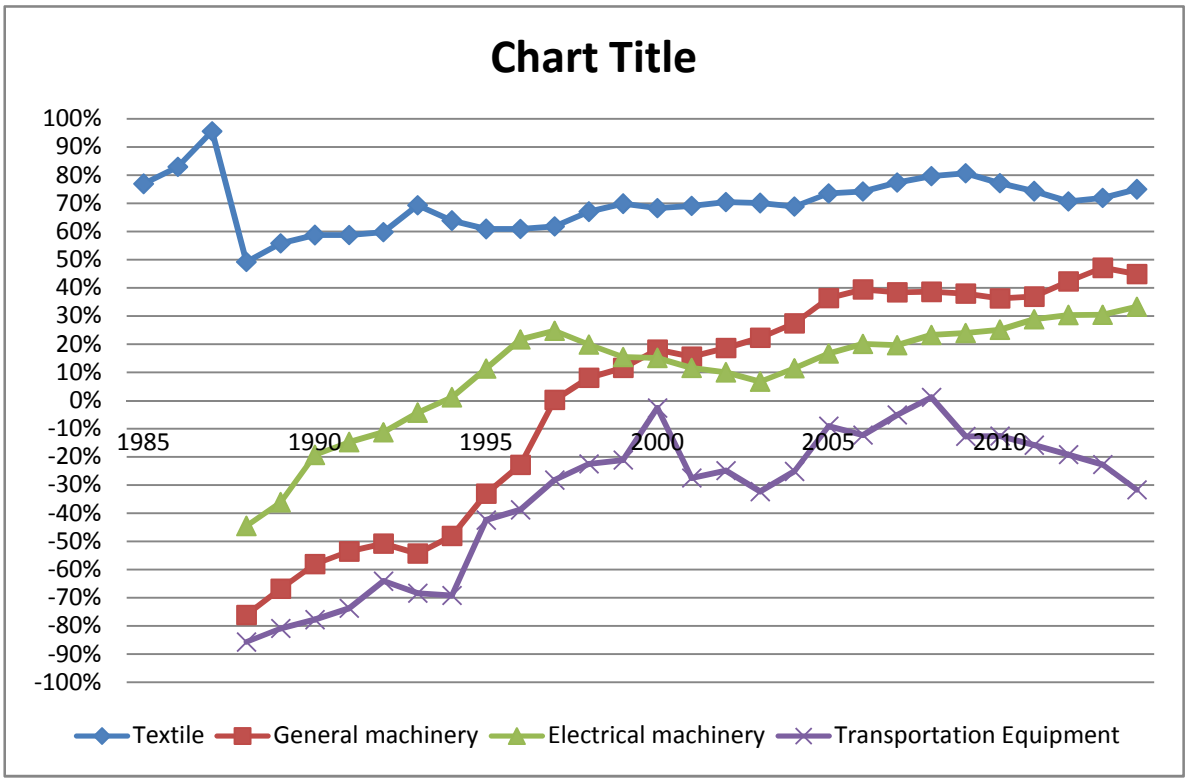
Chinese industrialization until the mid-1990s was based on cheap labour backed bystateindustrial, technological and trade policies[3]. Chinese wages were kept at 5 per cent of US levels by devaluation of Yuan until then (Yokokawa 2013). Contribution by the structural change (3.47%) and the increase of VAL in second and tertiary sectors (3.21%) are quite large in the 1980s (Table 2). When its exchange rate was stabilized in the mid-1990s Chinese Lewis-type industrialization reached its limits. Its rapid wage rise was reflected in its trade specialization in light industries such as textiles and toys which peaked in

[3]"China had undertaken much less trade liberalisation than most other developing countries. This is why manufacturing employment grew so rapidly in China, because it was not counterbalanced by major losses of employment through the effects of displacement of domestic industry because of import competition" (Ghosh, 2016, p. 281). For ITT policies see Chang 2002.

the late 1980s (Fig. 19).

Fig. 19China's compressed industrialization(1985-2014)

Trade specialization = (export-import)/ (export+import)



Source: RIETI-TID, http://www.rieti-tid.com/

In the 1990s and 2000s open product architecture with core chipsets enabled China's compressed industrialization. Chandrasekhar(2013,p. 83)noted "There is a new international division of labour emerging in which Knowledge is controlled by firms in the developed courtiers even while the production of knowledge-based industries and services moves to countries like India and China."Chinese dynamic comparative advantage in machinery such as electrical and general machinery increased rapidly from the mid-1990s onwards[4] (Fig. 19).

[4]"The output of high-technology manufacturing located in China rose nine fold over the period 1995-2007 from $19 billion to &167 billion. . . . high-tech export from China rose rapidly after 2000"(Chandrasekhar 2013, p. 63).

Table 3 Chinese Trade

	Exports from China %					China's imports %				
	Japan	Korea + Taiwan	ASEAN5	USA	EU27	Japan	Korea + Taiwan	ASEAN5	USA	EU27
1991	13.1	3.4	4.8	18.5	16.7	18.1	1.7	6.1	15.6	17.5
1995	16.1	4.7	4.4	21.6	14.9	24.8	9.2	8.1	13.8	18.6
2014	8.0	6.1	7.2	20.9	19.7	11.0	12.6	10.0	9.2	14.5

ASEAN5=Indonesia, Malaysia, Philippines, Singapore and Thailand.

Source: RIETI-TID, http://www.rieti-tid.com/

Table 3 shows that Japan's influence on the Chinese economy peaked in the early 1990s. In this period Japan created a Pacific Rim triangle traderegime whereby Japan exported capital goods to the ASEAN and China, and ASEAN and China exported completed products to the USA. After China became a member of the WTO, its share of international trade skyrocketed. Japanese goods exports to China and imports from China increased dramatically, raising Japanese trade dependence from 10% since 1985 to 15% again between 2002 and 2007. This enabled Japan to adopt export-led growth strategy again and to recover from the decade long depression. However, Japan could not keep pace with China, and its share in China's international trade was reduced both as exports and imports. Applying open architecture China imports technology from the USA, capital goods from Japan, Korea and Taiwan, and food and raw material from less developed countries, and exports completed products to the EU, USA, Asia, and other areas. The cross-border division of work and trade in Asia has been completely rebuilt by China, and the Japan-led Pacific Rim triangle trade regime has been replaced by a China-centric Asian production network.

Conclusion

The rise and fall of Japanese economy may be summarised as follows. In the period of diversification of Bureaucratic Capitalism, the centre of economic growth shifted from the USA to Asia.Japan introduced integral product architecturein machinery industries, and created Pacific Rim triangle trade regime. The USA created open architecturein ICT and knowledge intensive industries as the new dynamic industries, which successfully combined platform leaders in the USA and assembly makers in developing countries. The new dynamic industries enabled China's compressed industrialization, and the China-centric Asian production network replaced the Japan-led Pacific Rim triangle trade regime in the 2000s.

We are still in the beginning of the end of Bureaucratic Capitalism. Although ICT and knowledge intensive industries have high possibility to increase productivity with built-in software and internet (IoT), developing productivity of ICT requires solving demand constraint by creative destruction of theneoliberal capital accumulation regime andcreating a new production-led capital accumulation regime[5]. It requires

[5]"Growth strategies need to change towards models that focus on the potential of domestic and regional

following.Firstly, inequality of VAL between closed and open areas must be resolved. The non-excludable and non-rivalrous character of software-led ICT and other knowledge intensive industries makes it more and more difficult to keep closed area closed. Itmay require making these goods to public goods to reduce international VAL inequality. Secondly, inequality in distribution of VAL between wages and profits must be reduced in order to make wages the engine of demand growth. Thirdly, stable international monetary system such as Keynes' International Clearing Union, and stable domestic monetary system must be recreated (Yokokawa 2016, Kregel 2015, andGhosh 2016).

References

Akamatsu, K. (1962) "A Historical Pattern of Economic Growth in Developing Countries", *The Developing Economies, Institute of Asian Economic Affairs*, Preliminary Issue No.1, pp. 3-25.

Aoki, M. 2011. "The Five-Phases of Economic Development and Institutional Evolution in China and Japan", ADBI Working Paper 340. Tokyo: Asian Development Bank Institute. www.adbi.org/working-paper/2011/12/30/4836.five.phases.economic.dev.evolution.prc.japan/ Aoki

Chandrasekhar, C.P. "Knowledge and the Asian Challenge" in Yokokawa etal. eds. (2013).

Chang, Ha-Joon (2002) *Kicking Away the Ladder – Development Strategy in Historical Perspective*, Anthem Press.

Fujimoto, Takahiro (2014) "Architecture, Capability, and Competitiveness of Firms and Industries", mimeo.

Glyn, A. (2006), *Capitalism Unleashed*, Oxford, Oxford University Press.

Ghosh, Jayati (2013) "Growth and emergent constraints in the Indian economy in the context of global uncertainty", in Yokokawa etal. eds. (2013).

Keynes, J. M. (1980) The Collected Writings of John Maynard Keynes, Activities 1940-44 Shaping the Post-war world The Clearing Union, Vol. XXV, London: Macmillan for the Royal Economic Society.

Kregel, Jan (2015) "Emerging Market Economies and the Reform of International Financial Architecture:

The "exorbitant privilege" of the dollar is only the symptom of a structural problel", Levy Economics Institute of Bard College, *Public Policy Brief,* No. 139, 2015

Minsky, Hyman (1992) "Chapter 7: Schumpeter and Finance", pp. 103-115, in Salvatore Biasco, Alessandro Roncaglia and Michele Salvati, Eds. *Market and Institutions in Economic Development: Essays in Honor of Paulo Sylos Labini*. London, England, New York, NY: MacMillan, 1992.

MITI (2001) *White Paper on International Economy and Trade*.

Nihon Kokusei Zue (2013), Tokyo, Yano Tuneta Publish.

---

markets, not just global markets. This means increasing employment and ensuring that wages increase with productivity" (Ghosh, p. 276)

OECD (2014) “Long-term baseline projections” *Economic Outlook* No 95, May http://stats.oecd.org/index.aspx?queryid=51396

Palley, Thomas I. (2010) “The Limits of Minsky’s Financial Instability Hypothesis as an Explanation of the Crisis” *Monthly Review*

Perez, Carlota (2003) *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*, Edward Elgar

RIETI (Research Institute of Economy, Trade and Industry), RIETI-TID, http://www.rieti-tid.com/

Rowthorn, R. E. (2016) “The emergence of China and India as great powers”, in Yokokawa et. al, eds. (2016).

Rowthorn, R. E. and Wells, J. R. (1987), *De-industrialisation and Foreign Trade*, Cambridge: Cambridge University Press.

Suehiro, Akira (2014) *Shinko Ajia Keizairon* (in Japanese), Tokyo, Iwanami.

Tatsumoto, Hirofumi, Ogawa, Koichi, and Shintaku, Junjiro (2010) “Standardization, International Division of Labor and Platform Business” *Tokyo University MMRC DISCUSSION PAPER SERIES*.

Vernon, Raymond (1966) “International Investment and International Trade in the Product Cycle”, *Quarterly Journal of Economics*, Vol. 80, May pp. 190-207.

Yokokawa, Nobuharu (2012) “Cyclical Crisis, Structural Crisis, Systemic Crisis, and Future of Capitalism” in Yokokawa etal. eds.(2012).

Yokokawa, Nobuharu (2013) “The Renaissance of Asia and the Emerging World System” in Yokokawa Ghosh, and Rowthorn. eds. (2013).

Yokokawa, Nobuharu (2016) “Dynamic Comparative Advantage and the New Flying Geese Theory of Capitalist Development” in Yokokawa et. al. eds. (2016).

Yokokawa Ghosh, and Rowthorn. eds. (2013) *Industrialization of China and India: Their Impacts on the World Economy: Their Impacts on the World Economy*, Routledge.

Yokokawa, Kiichiro Yagi, Hiroyasu Uemura, and RichardWestra eds. (2016) *The Rejuvenation of Political Economy (Routledge Frontiers of Political Economy)*.

Yoshikawa, Hiroshi (2012) *Kodo Seicho*, Tokyo, Cyuou Koron Sha.