THE CHALLENGE OF SUCCESSFUL GLOBALISATION: JAPAN VERSUS CHINA

- *Although the advantages of globalisation are contested in some countries, notably in France, the same cannot be said for Japan. Confronted with the accelerated aging of its population, Japan has reaped the full benefits of globalisation. It particular, it has profited from its proximity to China (the two countries are highly integrated commercially, and trade is very complementary).*

- *Japan sells products to the industrialised countries, notably the United States, that China exports very little of if at all (such as automotive components or sophisticated electronics). In Asia, and China in particular, Japan sells capital goods, electronic components (mainly through intra-company trade) and steel products. In return, it imports mainly consumer goods (electronics, textiles, etc.) assembled or manufactured in other Asian countries, taking advantage of their low-cost labour supply.*

- *For the moment, Japan has an undeniable technological lead that it intends to maintain. Consequently, it manages the relocation of production to China in its best medium- to long-term interests: it only transfers assembly operations for products that have already been largely amortized technically, and it provides major, long-term financing for R&D investments, which are particularly effective for producing innovation.*

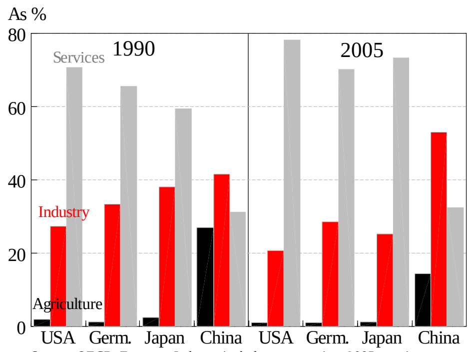
I. TWO COMPLEMENTARY COUNTRIES THANKS TO VERY DIFFERENT STAGES OF DEVELOPMENT

The enormous development gap between Japan and China coupled with their geographic proximity has made the two countries highly complementary from an economic perspective.

A substantial development gap

The breakdown of GDP illustrates the development gap between Japan and China. The classic development cycle – in which agriculture is gradually overtaken by the rise in industry, which eventually contracts in favour of the services sector – is nearing its end in Japan, but is still far from complete in China.

BREAKDOWN OF GDP



Source: OECD, Eurostat. Industry includes construction. 2005 = estimate. For Germany: 1993 instead of 1990

With the industrialisation of China between 1990 and 2005, industry's share of GDP rose from nearly 42% to over 53%, as China became one of the world's main sources of manufactured goods. Yet, even though agriculture's contribution to Chinese GDP declined from over 27% in 1990 to 14% in 2005, China is still a highly agricultural economy. China is the world's leading agricultural producer[1], but it does not export much produce due to the size of its population. Sauvy's overspill effect is well underway as farmers from the western provinces are swarming to the east coast to find industrial jobs. The share of services, in contrast, has levelled off at a low level over the period.

Demographic constraints with a 20-30 year lag

Japan is prematurely facing the accelerated aging of its population, which began to contract in 2005. This trend is due to a sharp scissor effect – a decline in the fertility rate combined with an increase in life expectancy – which has driven the dependency ratio to levels that are hardly sustainable.

In comparison, China's situation is more favourable. China's population will continue to grow for another 20 to 30 years. With an average fertility rate of 1.7 births per woman – roughly the same as in the industrialised countries – China's one-child policy has not been respected very rigorously in the countryside. Notably, it does not apply to the minorities, most of which live in rural areas. In contrast, the policy has been largely followed in urban areas. As a result, Chinese cities will be confronted with one of the problems of the wealthy countries, even before it joins their ranks. Nonetheless, a fertility rate of 1.7 is still lower than the replacement rate of 2.1 births per woman.

		1950	1975	2000	2025	2050
Japan	Population (millions)	83	111	127	125	112
	Fertility rate	2.7	2.0	1.4	1.6	1.8
	Life expectancy	63.9	73.3	80.5	85.3	88.3
	Dependency ratio	68	47	47	71	97
China	Population (millions)	554	928	1.274	1.441	1.392
	Fertility rate	6.2	4.8	1.7	1.8	1.8
	Life expectancy	40.8	63.2	69.7	74.4	78.7
	Dependency ratio	61	78	46	46	65
United States	Population (millions)	158	220	284	350	395
	Fertility rate	3.4	2.0	2.0	1.8	1.8
	Life expectancy	68.9	71.5	76.5	79.6	82.4
	Dependency ratio	54	55	51	57	61
South Korea	Population (millions)	19	35	46	49	44
	Fertility rate	5.4	4.3	1.5	1.4	1.8
	Life expectancy	47	62	74	81	84
	Dependency ratio	81	71	39	48	87

Source: United Nations

Dependency ratio: the over 64 age group as a percentage of the 15-64 age group

[1] *In 2004, China produced 13.5 % of the world's fruit, 18% of grains and 49% of vegetables, and owns 50% of the world's pig population.*

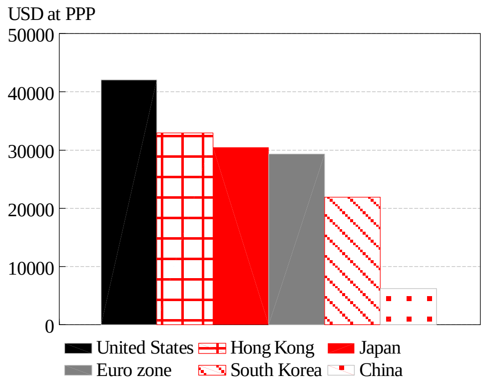
Japan and China: a rich and relatively egalitarian country versus a still poor and relatively imbalanced country

In 1970-85, Japanese growth was founded primarily on the middle class, resulting in a relatively egalitarian country in terms of household revenues (Japan has a Gini index of 25%). Development was based on a highly selective educational process that opened the doors to major universities, an indispensable step in gaining access to lifetime employment in a major corporation.

In comparison, the dual nature of Chinese society is much more apparent, with relatively well-off urban areas and very poor rural areas. China's Gini index is 45% like the United-Sates, and 16.6% of the population live in poverty (less than US$1 per day at PPP).

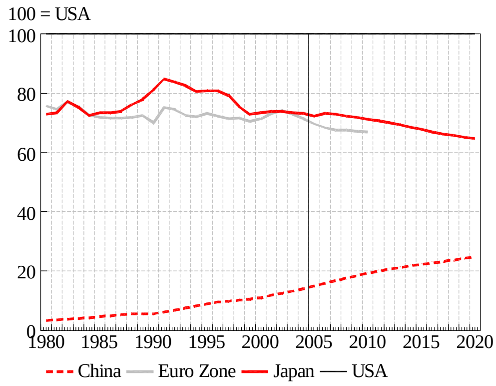
Human development is another key differential between the two countries. According to the UN's human development index (HDI), Japan ranked 11th out of 177 in 2005, while China ranked 85th, alongside the Philippines. Yet given China's unequal society, the overall indicator does not reflect the sharp disparities in development between certain ultra-modern urban areas and the rural regions in the western part of the country.

GDP BY HEAD: 2005



Source : EIU

GDP PER HEAD RELATIVE TO THE US



Source : EIU

Japan is not only more egalitarian, it is also much wealthier. In 2005, Japanese GDP per head at PPP was nearly five times higher than China's. Yet the wealth gap between the two countries is gradually narrowing. After a catch-up phase, Japanese GDP per capita has been contracting relative to the Americans since the early 1990s. China, in contrast, is still in a start-up phase, and is gradually gaining ground on the Americans.

There is still an enormous gap in terms of average living standards[2], which is unlikely to be closed for another fifty years.

[2] Assuming the Chinese economy is not hit by any major shocks over the next 50 years.

One reflection of the wealth gap between the two countries is the household equipment rate: compared to over-equipped Japanese households, Chinese households are relatively under-equipped. In China, as always, a distinction must be made between rural and urban areas. Consequently, for Japanese manufacturers, China represents a huge market with very strong growth potential, a point that has helped foster integration between the two countries.

HOUSEHOLD EQUIPMENT RATE

*: 2005, **: 2003 ***: 2002	Japan	China	
		Urban areas	Rural areas
Automobiles	81.6%*	1.4%**	-
Mobile phones	82.0%*	90.1%**	23.7%**
PC	64.6%*	27.8%**	-
Air conditioning	87.0%*	51.1%***	0.15%***
Colour television	99.3%*	130.5%**	67.8%**

Sources: OECD, Cabinet Office, China Statistical Yearbook

II. TWO HIGHLY INTEGRATED ECONOMIES

The development gap between Japan and China, their geographic proximity, and China's enormous labour supply and market potential have facilitated the integration of the two economies.

First, commercial integration

The two countries have developed considerable trade relations. This movement took place in two phases. The strong rise in Japanese exports to China was followed by an increase in Japanese imports of goods manufactured or assembled in China.

The breakdown of Japanese exports by region shows a net shift toward China & Hong Kong, which has become Japan's second largest supplier after the United States, ahead of the Eurozone.

Imports/exports to: (% of total imports/exports)

2000		USA	Eurozone	Japan	China+HK	SE Asia	Other
Japan	Exports	27.6	15.1	-	11.1	31.9	14.3
	Imports	17.6	11.4	-	13.9	24.5	32.6
China +HK	Exports	22.0	15.3	11.7	-	6.6	44.4
	Imports	8.4	11.3	15.3	-	10.1	54.9

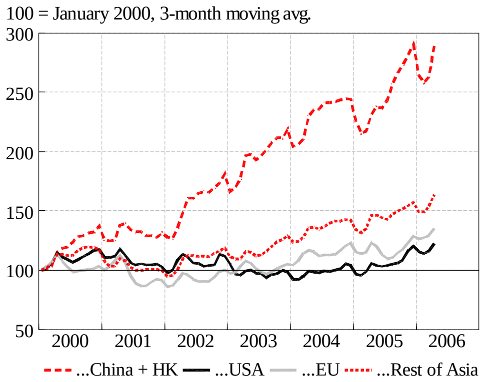
Sources: Datastream, CEIC; SG calculations
SE : south east

Imports/exports to: (% of total imports/exports)

2005		USA	Eurozone	Japan	China+HK	SE Asia	Other
Japan	Exports	20.5	13.3	-	17.7	31.2	17.3
	Imports	11.3	10.3	-	19.4	20.4	38.6
China +HK	Exports	19.9	17.7	9.4	-	6.9	46.1
	Imports	6.7	10.0	13.9	-	11.8	57.6

Source: Datastream, CEIC; SG calculations
SE : south east

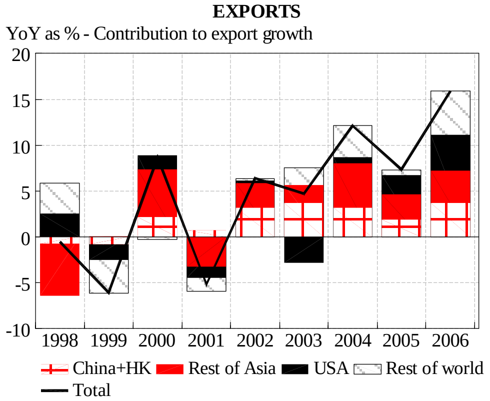
JAPANESE EXPORTS TO...



Source : Japan Customs

The breakdown of Japanese export growth by major geographic region shows the very strong gearing effect of China & Hong Kong. Dynamic Chinese demand is largely responsible for the rebound in Japanese growth since 2002, which has enabled Japan to pull out of the "lost decade".

EXPORTS

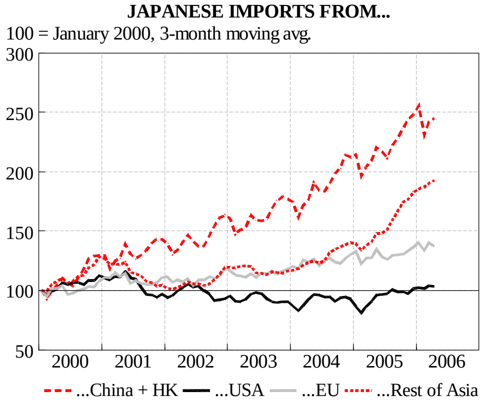


Source: MoF; 2006 = January-March

As for China, although Japan is still its leading supplier, the share of Japanese imports has tended to contract. Yet this trend can be blamed on the commodities effect (upsurge in commodity prices combined with an increase in import volumes), which increases the share of Chinese imports from "other" countries, as indicated in the tables above.

As of mid 2000, the boom in Japanese exports to China fuelled a surge in Japanese imports from China & Hong Kong, which became Japan's leading supplier as of 2002.

JAPANESE IMPORTS FROM...



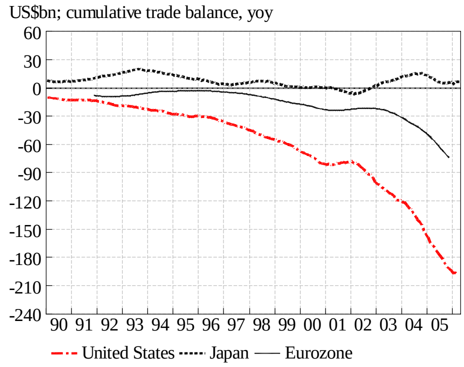
Source : Japan Customs

It is important to note, however, that the integration of trade between China & Hong Kong and Japan lagged behind the development of trade between China and the rest of the world. Although this lag has now been closed, it was due to the fact that Japan was already highly integrated in the ASEAN countries, while China was only just beginning to open to the world.

Chinese products did not penetrate the Japanese market as strongly as in the other industrialised countries. In value terms, Chinese exports increased 2.3 fold worldwide between 2000 and 2005, but only 1.9x for Japan, compared to 2.7x for the Eurozone and 2.1x for the United States. Over the same period, however, although total Chinese imports increased 2.2x, fuelled by buoyant purchases of basic goods, imports from Japan increased 2x, which is significantly stronger than in Europe and the United States (1.9x and 1.7x, respectively).

All in all, unlike the United States and Europe, which have run up enormous trade deficits that are still swelling with China & Hong Kong, Japan has maintained a trade surplus with China & Hong Kong, despite cyclical fluctuations.

TRADE BALANCE WITH CHINA + HK



Source: National statistics

Better trade terms with China steps up integration

Since 2004, China has surpassed Japan to become the world's 3rd largest exporter behind the United States and Germany. Thanks to its comparative advantage, namely a very abundant, low-cost labour force, China has become integrated in the world economy. By attracting foreign capital and absorbing the surplus labour supply in rural areas, China has specialised in labour-intensive products.

Worldwide, there has been a simultaneous rise in the global offer of labour-intensive products and world demand for technology and energy-intensive products. This has put downward pressure on the prices of labour intensive products relative to high-tech products and commodities. As a result, trading terms have deteriorated for China but improved for its trading partners. Countries that are fairly complementary with China – including commodity-exporting countries and certain industrialised countries like Japan – have seen an improvement in trade terms with China. In contrast, countries in direct competition with China have seen a rapid deterioration in their situations. Some examples are the ASEAN countries and certain European countries like Italy.

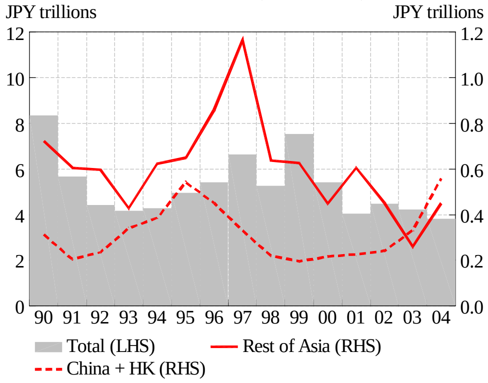
Nonetheless, China recently managed to carry over part of the upsurge in commodity prices to the export prices of manufactured goods, which should help offset this trend.

Integration triggers a rise in FDI

As was the case for commercial integration, Japan initially invested more in the rest of Asia than in China & Hong Kong. This is due to several factors:

- Japanese companies were already highly implanted in the ASEAN countries, which limited the flow of Japanese FDI into China.
- With its major investments in the region, Japan was particularly hard hit by the Asian crisis of 1997, especially after deflation struck in 1998 and banks began to face up to a mountain of doubtful loans. These shocks largely cutback Japanese investment, notably in Asia, and through a ricochet effect, in China as well.

JAPANESE FDI (OUTWARD)

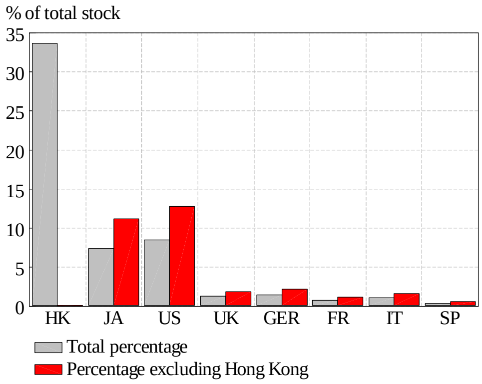


Source : Ecowin

Furthermore, Japanese FDI, unlike American and European FDI, mainly financed greenfield investments, which are less capital intensive. Consequently, FDI figures are not very representative of the weight of Japanese facilities abroad (as a percentage of GDP, the stock of outward FDI account for only 8% of GDP in Japan, compared to 17% in the United States).

Since 2003, this trend has been reversed. The share of Japanese FDI in China reached 15% of the total in 2004; and Japanese companies now hold about 11% of the stock of Chinese FDI ex FDI from Hong Kong.

FDI STOCK IN CHINA: 2005



Source : Ecowin

In addition to direct investments, Japanese firms have also relied heavily on outsourcing. This trend is amplified by original equipment manufacturers (OEM), which can be considered as an integrated form of subcontracting.

Outsourcing agreements were originally concentrated mainly in the computer industry, but have since spread to all manufacturing sectors: Chinese OEM manufacture components based on plans furnished by Japanese prime contractors.

So, not only is industrial integration between the two countries very high, but it is bound to intensify. The flow of Japanese FDI into China will help fuel new commercial trade, notably via intra-company commerce.

III. HIGHLY COMPLEMENTARY EXPORTS

Strong specialisation and concentration of trade between Japan and China & Hong Kong

The regional breakdown of trade by the Asian countries is relatively unique. Exports to other Asian countries generally consist of intermediary goods while exports outside the region consist mainly of consumer goods.

JAPAN: TOP 10 PRODUCTS TRADED WITH CHINA & HONG KONG

JAPANESE EXPORTS				JAPANESE IMPORTS			
Top 10	Products	A	B	Top 10	Products	C	D
1	Electronic components	11.6	30.4	1	Computer equipment	11.8	38.4
2	Electrical supplies	9.0	27.0	2	Ready to wear clothing	9.9	78.3
3	Specialised machinery	6.8	29.5	3	Underclothes	8.5	82.8
4	Iron and steel	4.9	27.1	4	Telecom equipment	5.2	43.3
5	Plastic products	4.8	34.5	5	Electrical supplies	4.0	30.7
6	Telecom equipment	4.7	28.5	6	Consumer electronics	3.5	46.3
7	Computer equipment	4.5	17.5	7	Leather products	3.2	42.4
8	Optical instruments	4.5	28.7	8	Meat products	3.0	54.0
9	Basic organic chemicals	4.3	27.5	9	Hardware	2.8	30.0
10	Engines	3.7	13.2	10	Carpets	2.4	72.0
	Total	58.7			Total	54.4	

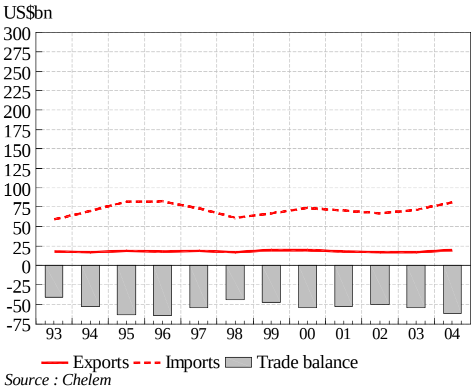
Source: Chelem

A: Japanese exports of this product category to China & Hong Kong as a percentage of total exports to this region
B: Japanese exports of this product category to China & Hong Kong as a percentage of total Japanese exports of this product category.
C: Japanese imports of this product category from China & Hong Kong as a percentage of total imports from this region
D: Japanese imports of this product category from China & Hong Kong as a percentage of total Japanese imports of this product category

This general description partially applies to trade between Japan and China & Hong Kong. Japan exports three types of products to China: intermediary goods for Chinese assembly plants (electronic components, electrical equipment, chemicals, etc.) capital goods (machines, engines, etc.) and steel products. In return, Japan imports consumer goods (textiles, computer and electronic equipment, etc.). Trade between Japan and China & Hong Kong is not only specialised, but also highly concentrated by region, as illustrated in the table above: trade with China & Hong Kong in the top product categories is shown as a percentage of Japan's trade with the world as a whole (column B and D).

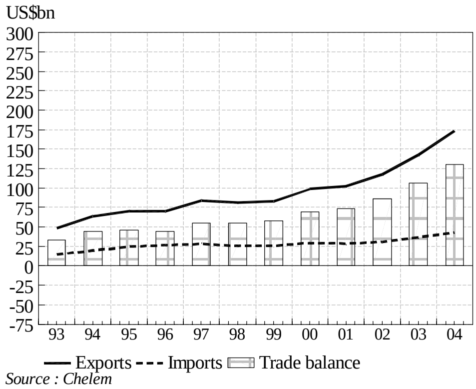
LOW TECHNOLOGY PRODUCTS

JAPAN



Source : Chelem

CHINA

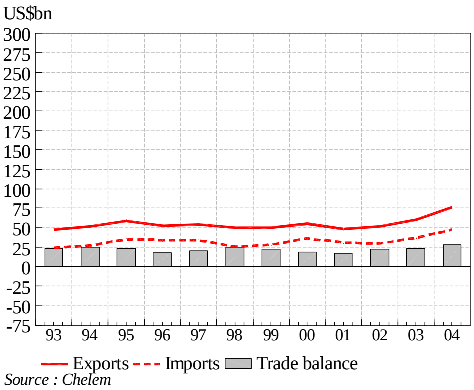


Source : Chelem

Low technology products include wood products, paper, cardboard, publishing, food products, beverages, tobacco, clothing, leather products and footwear.

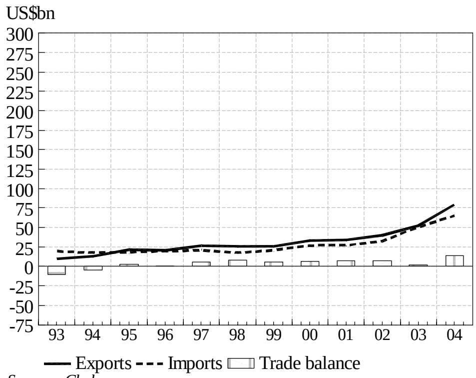
LOW-MEDIUM TECHNOLOGY PRODUCTS

JAPAN



Source : Chelem

CHINA

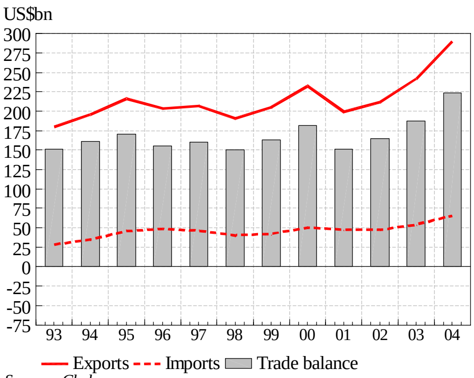


Source : Chelem

Low-medium technology products include petroleum-based products, coke, rubber and plastic goods, non-metallic minerals, ships and boats, basic steel products and metal structures, except machines

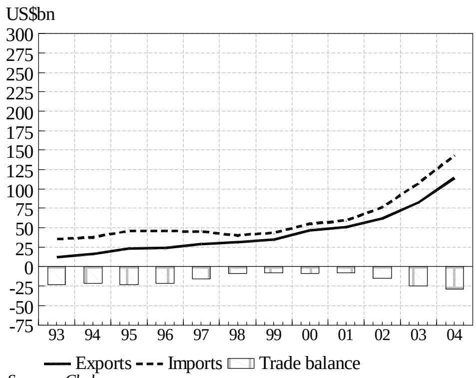
MEDIUM-HIGH TECHNOLOGY PRODUCTS

JAPAN



Source : Chelem

CHINA

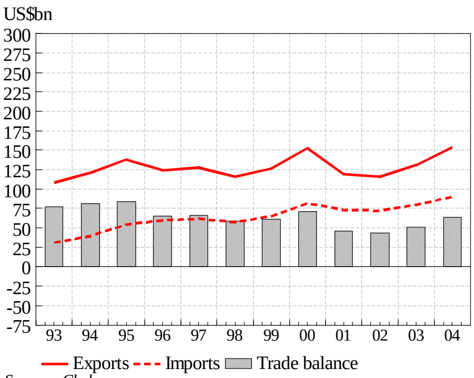


Source : Chelem

Medium-high technology products include electrical equipment and instruments, motor vehicles, chemical products except pharmaceuticals, rail and transport materials and machines.

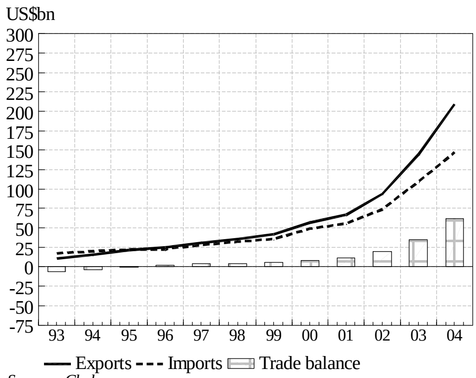
HIGH TECHNOLOGY PRODUCTS

JAPAN



Source : Chelem

CHINA



Source : Chelem

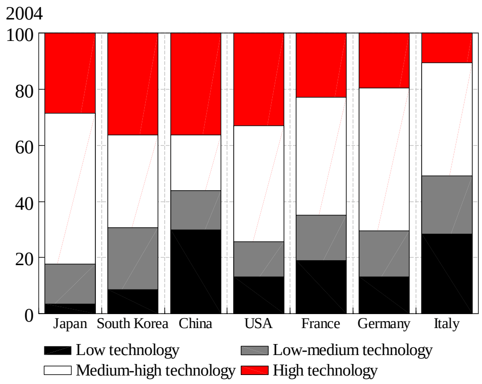
High technology products include aeronautics and space equipment, pharmaceuticals, computer equipment, electronics (radios, TV sets) and telecommunications equipment, medical and precision instruments.

A good example is clothing: over 78% of Japanese clothing imports come from China & Hong Kong. This enormous specialisation of trade also reflects the highly complementary nature of the two countries.

Two countries that do not compete much in the world market

The breakdown of exports by technology content highlights the different positioning of the two economies.

EXPORTS BY LEVEL OF TECHNOLOGY



Source : Chelem

Chinese exports of low-technology products have surged, notably for textiles and leather goods, thanks to its major comparative advantage in labour-intensive products. Naturally, this trend accelerated with the phase-out of the Multi-Fibre Agreements (MFA). Japan, in contrast, as could be expected, has an huge trade deficit in terms of low value-added products.

Both countries have rather weak positions in the market for low to medium technology products. This is the only technological level in which they really compete, but the amounts at stake are relatively small compared to other technological levels.

The size of Japanese exports of medium to high technology products is mainly due to the automotive and chemical sectors. Japan, along with Germany, currently enjoys the biggest comparative advantage in the automotive sector. Although China's trade balance in automotive products is deteriorating, there is nonetheless a simultaneous increase in exports and imports, reflecting the growth of its assembly business. Production capacity is rising at an accelerated pace in China, which implies imports of capital goods. In the end, it is countries specialised in medium to high technology products, notably in capital goods and the automotive sector, that benefit most from China's rapid growth. Along with Japan, Germany is the other country that meets this profile and thus benefits from Chinese growth. Exports of medium to high technology products account for over 50% of total German exports, compared to about 40% for France and Italy, two countries that have directly benefited very little or none at all from China's growth.

Lastly, both Japan and China report trade surpluses in high technology products. Yet competition in this segment is not as direct as it might seem for three reasons:

- Japan has been positioned in the high-tech sector for a long time, whereas Chinese exports have only boomed since the early 2000s.
- The upmarket shift in Chinese exports must be kept in perspective. Statistics are swollen by its assembly activities, which reflect a rapid and simultaneous increase in imports and exports in this product segment.
- The share of Japanese exports of high technology products might not be as high as expected, because Japanese firms increasingly specialise in strategic components with a high technology content, leaving assembly to be handled in China and the rest of Asia. When buying a mobile phone in New York[3], for example, at best only one out of ten handsets will be sold under a Japanese brand name. Yet that does not mean that Japanese companies have lost market share in the United States, which they consider to be their end market. Regardless of where they are sold – in America, Europe or South Korea – mobile handsets would not exist without components "made in Japan". Motorola[3], which ranks second in the mobile handset market, does not make handsets in Japan, but Japanese companies manufacture about 70% of its components.

In the end, not only are these two countries highly integrated with a very high level of trade specialization, they are rarely in direct competition when trading with the rest of the world.

IV. Will Japan continue to lead the "flying geese" economic model?

Although the complementary nature of trade and the industrial integration of the two countries is one of the prerequisites for a developed country to benefit fully from globalisation, it must also manage its technological advance very carefully, by limiting technology transfers to more labour intensive countries. Japan is striving to maintain this lead through a suitable development policy.

Japan invests heavily in research to generate innovation

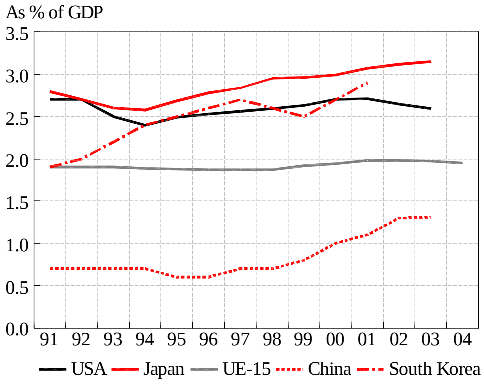
- *Massive R&D spending*

With R&D spending exceeding 3% of GDP[4], Japan is one of the OECD countries that devotes the biggest share of its budget to R&D. This ratio is not only high, but even during the so-called "lost decade", it remained higher than in the other industrialised countries.

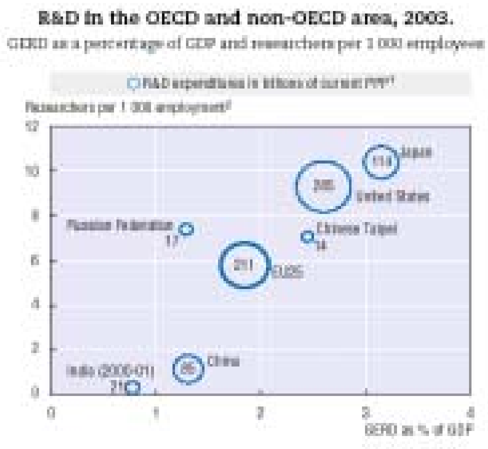
[3] See the Nikkei Weekly of March 6, 2006.

[4] According to the Lisbon criteria, EU-15 governments are committed to reaching a R&D investment ratio of 3% of GDP by 2010. At 1.90% in 2004, the current level still falls far short of this target.

TOTAL R&D SPENDING



Source : OECD

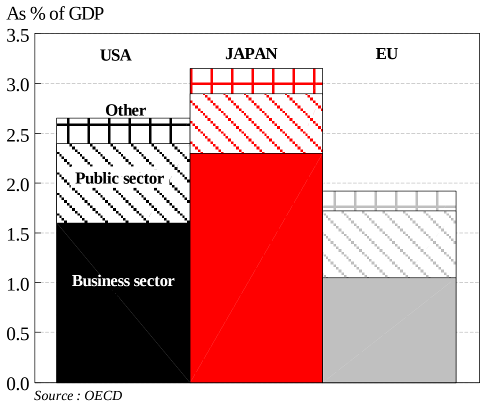


Source: OECD

Furthermore, in Japan, nearly 75% of R&D expenses are financed by the private sector, and thus tend to be richer in innovation. This percentage is significantly higher than in other countries: 63% for the United States, 60% for China, and 55% for the EU-15. Yet, the relative importance of private-sector R&D spending in Japan can also be attributed in part to the low level of investment in national defence.

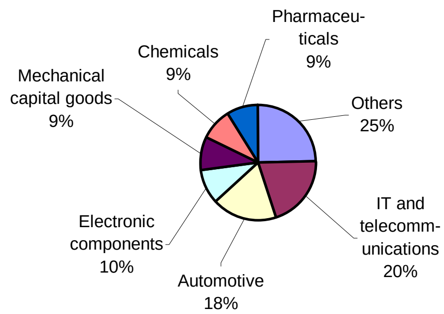
The breakdown of Japanese R&D investment by sector (in descending order) shows that the most important sectors are information technology and telecommunications, followed by automobiles, electronics, capital goods, chemicals and pharmaceuticals. This sector breakdown clearly reveals the very pragmatic approach to research, which is heavily geared towards product innovation.

TOTAL R&D SPENDING - 2003



Source : OECD

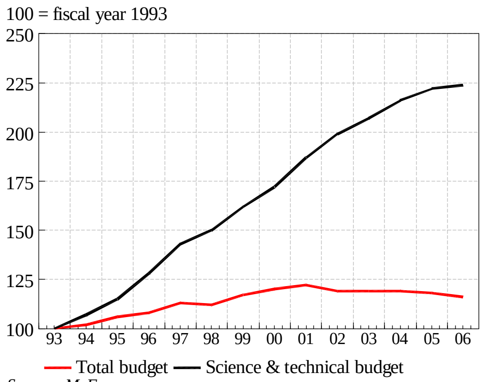
R&D BY SECTOR



Although the majority of R&D investments are financed by the private sector, they are nonetheless supported by strong government efforts to encourage their development. There are three support channels:

- Despite cutbacks in public spending since 2001, the public research budget has increased constantly;
- Private companies investing in R&D are eligible for major tax reductions;
- Strong incentives encourage collaboration between universities and the private sector (via joint research centres).

MAJOR PUBLIC SUPPORT FOR RESEARCH



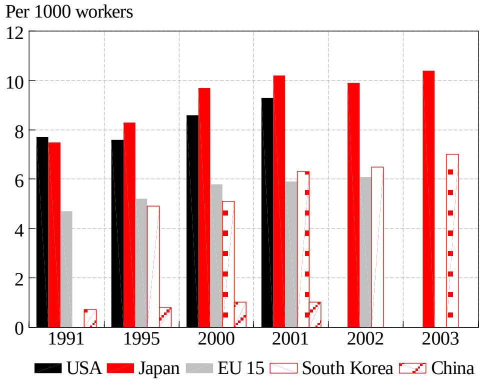
Source : MoF

A large pool of qualified human resources to staff research centres

Extensive human resources qualified in the field of research support these massive R&D investments. Japan has the highest density of researchers in the world, with 12 researchers per 1,000 employees. Furthermore, Japanese researchers are very productive in terms of innovation.

Given its size effect, China has had more researchers than Japan since 2002. Moreover, China suffers from brain drain to foreign countries, and even within China, there is a flight to foreign-owned companies.

DENSITY OF RESEARCHERS



Source : OECD

Another differentiating factor is the quality of the labour force. In Japan, 34% of the 25-64 age group has a degree in higher education, compared to only 5% in China. Yet Chinese students are much more mobile than their Japanese counterparts, and prefer to pursue their studies in the United States, Japan or Europe.

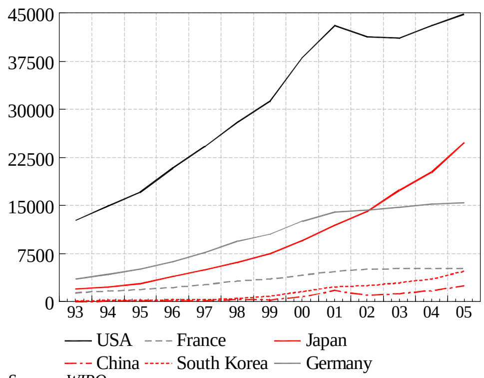
Thanks to a massive but pragmatic R&D policy – one that encourages research and innovation in potentially buoyant sectors in the medium to long term – coupled with close public-private collaboration, a rich source of innovation, Japan has managed to maintain its net technological advance over China

Japan benefits from a major technological lead

Thanks to the quality of Japanese research, the number of patent registrations is on the rise

The 3 February 2006 report by the World Intellectual Property Organisation (WIPO) confirmed that in 2005, for the third consecutive year, Japan ranked second behind the United States in terms of patent registrations, with 25,145 registrations, up 24.3% compared to 2004. According to the report, fifteen Japanese companies[5] rank among the 50 most innovative companies in the world. These statistics confirm Japan's major technological advance over China, and the trend currently seems to lean largely in Japan's favour.

REGISTERED PATENTS



Source : WIPO

[5] *Notably, Matsushita Electric (2nd), Sony (16th), Mitsubishi Electric (17th), Toyota Motor (19th)* and *Fujitsu (23rd)*

Increase in the number of foreign research centres in Japan

Japan has begun to attract the research centres of major foreign corporations that want to take advantage of Japan's expertise. This favourable trend only reinforces Japan's dominant position.

Company	Announcement or start-up date	Reason for transferring R&D centre to Japan
Advanced Micro Devices	*June 2004*	*Mobile technology in which Japan leads the world.*
Dupont	*November 2004*	*Many of customers have R&D bases in Japan.*
Google	*December 2004*	*Broadband and mobile technology in which Japan is very strong.*
Cisco Systems	*February 2005*	*Cutting-edge Internet technologies.*
IBM	*June 2005*	*System Design and support for customers in Japan and Asia-Pacific.*
MSN Group, Microsoft Corporation	*July 2005*	*Mobile technology in which Japan leads the world.*
Applied Biosystems	*September 2005*	*Life sciences in which Japan is particularly strong.*

Source: *JETRO Japan Economic Monthly, November 2005*

Japan tries to limit strategic technology transfers

Although Japan's technological lead has enabled it to benefit fully from globalisation, it now faces the challenge of maintaining this advance over time.

Fastidious management of technology transfers

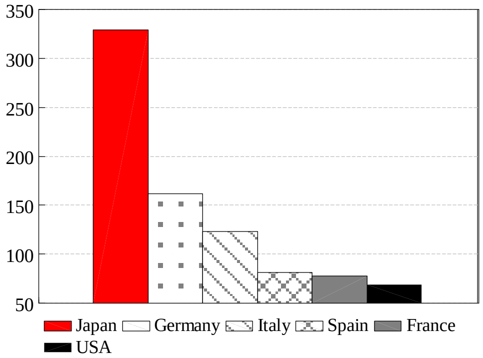
The principle is relatively simple: Japan only relocates production abroad if the technology has been fully amortised, while conserving at home the production of products with sensitive technology. Furthermore, to avoid unauthorised copying of products assembled abroad containing technology that has not yet been amortized, a "black box" approach is used (encapsulation of strategic components to be assembled, division of tasks, control over information, etc.): the technology cannot be duplicated and losses its effectiveness outside of the company that created it.

Japanese companies also value product differentiation, and count on rapid innovation and adaptation. Lastly, Japanese companies use very strict human resources management for production units relocated abroad, and actively seek to limit the promotion of Chinese managers.

High level of robots used in production

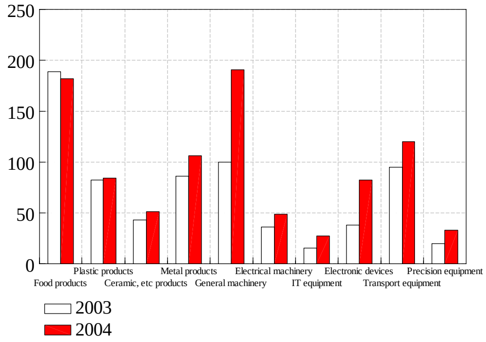
To counter high labour costs in Japan, and to keep production costs competitive with Chinese labour costs, Japanese industrials have opted for the ultra-robotisation of production sites in Japan. As a result, the density of robots in Japanese factories is much higher than in the other industrialised countries. Japan has an enormous technological lead in robots: in addition to productivity gains, they address the problems arising from an aging population and a contracting labour force.

NUMBER OF ROBOTS PER 10,000 EMPLOYEES
Manufacturing sector - 2004



Source : International Federation of Robotics

NEW PLANTS
BY MAJOR SECTORS



Source : Ministry of Economy, Trade and Industry

Although this movement was initially limited to the automobile industry, the development of increasingly general-purpose robots has triggered their spread into numerous other sectors, notably high-tech sectors requiring extremely meticulous tasks.

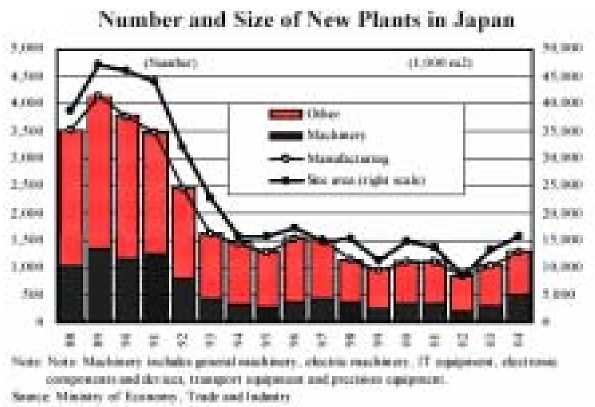
Some robots, like the e-bot 720, can operate for 720 hours a month without human intervention. It belongs to a new generation of general-purpose robots that no longer carry out precise tasks but complete production processes involving several tools and a series of tasks. Equipped with cameras, they can distinguish objects and grasp components or tools to be processed of different sizes and shapes, even those that are not in the right place. They can also detect certain anomalies.

Repatriation of production [6]

One of the consequences of the growing use of robots is the repatriation to Japan of production that was previously relocated abroad, generally in China or Southeast Asia. Two factors motivate this repatriation movement:

- To curb undesirable transfers of strategic technology and to protect intellectual property,
- To shorten the production cycle in order to be more responsive to technological developments. To achieve this, companies relocate strategic production operations near its R&D centres to benefit fully from synergies between researchers, industries and end consumers.

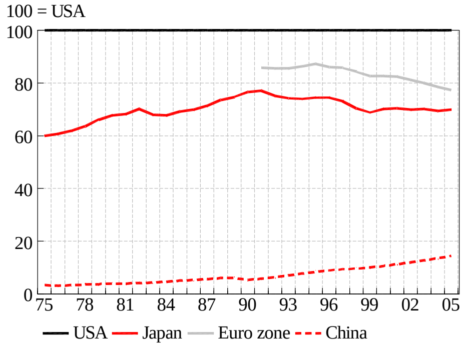
As a result, there has been a rebound in the number and surface area of new plants since 2003.



Strong rebound in labour productivity

Thanks to massive R&D investments in the past and the high use of robots in production facilities, labour productivity relative to the United States has levelled off in Japan since the end of the 1990s, unlike the Eurozone, where productivity has declined. Consequently, despite the strong demographic limitations straining the country, the Bank of Japan has raised its estimate of Japan's potential long-term growth rate to 1.5-2%. In the medium term, the lower range of this estimate seems plausible.[7] In the longer terms, however, Japan's growth potential will have to be revised downward to take into account the increasingly heavy strain of demographic factors.

LABOUR PRODUCTIVITY
RELATIVE TO THE UNITED STATES



Source : Rexecode

Faced with this situation, China has entered a catch-up phase since the early 1970s. Nonetheless, labour productivity in China contrasts widely between employees of mixed and foreign-owned companies and those of inefficient state-owned companies.

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[6] Here Japan is encountering a new phenomenon: the repatriation of certain production sites that were previously relocated to regions with low wage costs. Due to the unprecedented nature of this movement and the absence of a special term, we have coined the term "repatriation of production".

[7] The OECD estimates Japan's GDP growth potential for the period 2006-2011 at 1.4% a year, despite an annual 0.9% decline in the active population.