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**Chinese Firms as Emerging Competitors –
Challenges for Japan's Industry**

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1. 1. Abstract

„Aiwa’s low-price strategy undercut by Chinese rivals.“^{1[1]} – “The principle of competition is awakening the sleeping lion.”^{2[2]} Headlines like these that appeared recently on leading Japanese newspapers and magazines are an expression of rising concerns about the emerging competitiveness of China. While the discussion on the admission of China to the World Trade Organization (WTO), expected for the near future, is dominated by growing hopes and expectations among the industrialized countries for easier access to the huge Chinese market, a growing number of observers start pointing to the potential of China to become an economic superpower and formidable global competitor. It is the objective of this paper to provide a comprehensive overview on China’s growing international competitiveness in manufacturing and to speculate on possible implications for Japan’s industry. The key issues addressed in this paper are:

- - What are potential sources for competitive advantages by Chinese firms vis-à-vis Japanese firms?
- - In which industries can a growing competitive pressure by Chinese firms be expected?
- - What are possible counter-strategies by the respective Japanese industries?

The analysis proceeds in four steps. In Section 2, empirical evidence for China’s growing competitiveness is given by referring to empirical data on

^{1[1]}“Aiwa’s low-price strategy undercut by Chinese rivals.” In: Nikkei Weekly, 6.3.2000, p. 1/19.

^{2[2]}“Kyoso genri ga nemureru shishi okosu.”(The principle of competition is awakening the sleeping lion). In: Nikkei Business, 29.11.1999, p. 6-7.

trade and factor endowments. It is shown that China's advance to the world's 10th largest trading nation and its recent strong export performance in manufactured goods can be explained by growing competitive advantages not only in respect to labor-intensive industries, but increasingly also in (human) capital- and scale-intensive industries.

Section 3 attempts to provide a theoretical explanation of China's growing competitiveness in industrial goods. Within the Porter concept of "National Competitive Advantage" it is argued that China has moved to the threshold of the investment-driven development stage backed by two mutually enforcing mechanisms of advancing national competitive advantage: 1) "processing trade" that serves as an important mechanism for factor advancement in labor cost-intensive industries, and 2) domestic reforms that has led to factor advancement in (human) capital-intensive industries by releasing domestic competitive forces.

In Section 4 various examples are given for Chinese industries and firms that are emerging or have already emerged as formidable competitors on global markets. While Chinese competitiveness is mostly recognized for labor cost-intensive industries like textiles, consumer electronics or home appliances, particular attention is given to growing Chinese competitiveness in (human) capital-intensive industries like steel or shipbuilding.

Section 5 analyses these developments from the perspective of Japan's industry. Following the analysis of patterns and trends in Chinese-Japanese trade, possible future scenarios and counterstrategies by Japan's industries are reflected upon. While being still quite speculative in nature, it is argued

that in particular in assembly industries that are both labor- and capital-intensive, Japanese companies are confronted with an increasing Chinese competitiveness derived from low labor costs, good product quality, and state-of-the-art manufacturing and product technology. This growing competitive threat is likely to force Japanese manufacturers to further move to overseas production and internationalisation of procurement thereby accelerating the process of “industrial hollowing-out” of Japan’s supplier and manufacturing base. In respect to (human) capital- and scale-intensive industries like steel, petrochemicals or automotive a different scenario is drawn arguing that in these industries the formation of strategic alliances between Japanese and Chinese firms are a sensible strategic response.

In Section 6, the main findings and conclusions are summarized.

2. 2. Empirical evidence for the growing competitiveness of China’s industry

Since the economic reform process started in 1979, the People’s Republic of China has not only emerged as the world’s 10th largest trading nation, but exports have developed into a major engine for economic growth and –even more impressively- manufactured goods nowadays account for the dominant share of China’s exports. The membership of China in the World Trade Organization, an agreement on which is expected for the near future, is likely to accelerate these trends and to further enhance China’s position on global export markets.

Beginning in 1979, the economic reform process with its strong focus on foreign trade and investment resulted in a transformation of China from an isolated, self-sufficient economy to one of the world's largest trading nations.^{3[3]} Between 1978 and 1997, China's foreign trade grew twice as fast as world trade with a nominal average rate of 15.5%, and trade volume jumped from \$78 billion to \$324 billion. Accounting for a mere 0.75% of world trade in 1978 this share rose to 4% in 1998. As a result, China's development has become more and more dependent on foreign trade with the share of foreign trade rising from 9.8% of GDP in 1978 to 35.7% in 1996.^{4[4]}

Exports developed at an even faster pace during this period and became the most important engine for growth, outperforming even the rapidly developing Newly Industrialised Economies (NIEs) like South Korea or Taiwan. The share of exports rose from 4.6% of GDP in 1978 to 19% in 1998, an increase by a factor of 18.9 times in terms of nominal value.^{5[5]} The export drive was accompanied by a remarkable shift in its composition by commodities. Prior to the reforms, primary products like petroleum or foodstuffs accounted for two-thirds of China's exports. However, since 1985 manufactured goods developed into the dominant export category accounting for 85% of exports in 1995. Until 1992, textiles, clothes, and footwear dominated Chinese export structure, but since the mid 1990s electrical machinery (e.g. household appliances), telecommunication equipment (e.g. switching equipment) and electronic products have emerged

^{3[3]} Chan, Thomas / Tracy, Noel / Wenhui, Zhu (1999). *China's Export Miracle – Origins, Results and Prospects*. Basingstoke / London, MacMillan Press, p. 35-50.

^{4[4]} Zhang, Xiao-guang (2000). *China's Trade Pattern and International Competitive Advantage*. Basingstoke / London, MacMillan Press, p. 2

^{5[5]} Chan / Tracy / Wenhui (1999), p. 8/9; Zhang (2000), p. 2.

as the most important export items.^{6[6]} In 1999, electric appliances and electronics surpassed clothing as the single most important export category accounting for 16.9% of total export value.^{7[7]}

China's WTO-membership is expected to accelerate these developments. The World Bank, for instance, projects an increase of China's share in world trade from 3% in 1992 to 10% by 2020 making it the world's second largest trading nation after the United States. Following the World Bank's assumptions, Chinese exports are expected to grow at an average annual rate of 10%, almost twice as fast a world trade as a whole. In this scenario, China advances to become the world's largest exporting nation by 2020 with a 9.8% share in world exports.^{8[8]} Other studies, though differing in their assumptions and econometric models, basically support the World Bank's projections in regard to the impact of China's admission to WTO on world trade and exports. The U.S. International Trade Commission (USITC) estimates the combined effects of China's tariff cuts to result in a 12.2% increase in Chinese exports.^{9[9]} Similarly, the Mitsubishi Research Institute calculates an increase in the growth of exports by 13.5%^{10[10]}, while the Fujitsu Research Institute forecasts an increase of the annual growth rate of exports by 2.07 percentage points between 1995 and 2005.^{11[11]}

^{6[6]} Chan / Tracy / Wenhui (1999), p. 13-18.

^{7[7]} "China exporters shift focus to electronics", In: Nikkei Weekly, 28.2.2000, p. 21.

^{8[8]} The World Bank (1997). China Engaged – Integration with the Global Economy. China 2020 Series, Washington D.C., p. 29-31.

^{9[9]} United States International Trade Commission (1999). Assessment of the Economic Effects on the United States of China's Accession to the WTO. Publication 3228, Washington D.C., p. 15-18.

^{10[10]} Mitsubishi Research Institute (2000). WTO kameigo no chugoku bijiness – sono kikai to kyoi wa do kawaruka (The China business after WTO accession – How opportunities and threats change?). Press release of 15.2.2000, Tokyo, p. 1.

^{11[11]} Fujitsu Research Institute (2000). Internal material obtained by the author.

The emergence of China as a leading export nation and the significant structural changes in the composition of its exports towards manufactured goods have recently stimulated broader academic research on the sources of China's growing international competitiveness. In his study, Zhang demonstrates by means of econometric modelling and testing that the patterns of China's trade and production and their development since 1978 are reflecting the underlying comparative advantages of China. To do so, tradable commodities are classified into 5 groups based on Chinese Industrial Classification of the National Economy reflecting differences in relative factor intensity: agricultural goods, natural resource goods (primary commodities), physical capital-intensive goods, unskilled labor-intensive goods, human-capital intensive goods (see chart 1).^{12[12]}

Chart 1: Classification of Industries

Agricultural goods (13)	Natural resource-intensive products (6)	Unskilled labor-intensive products (14)	Physical capital-intensive products (15)	Human capital-intensive products (14)
paddy rice	coal	sugar, tobacco, alcohol	petroleum refining	household chemicals
wheat	crude petroleum	other processed foods	coal products	medicines
other grains	ferrous minerals	cotton textiles	inorganic chemicals	agricultural machinery
oil-bearing crops	non-ferrous minerals	wool textiles	chemical fertilizers	industrial equipment
cotton	non-metallic minerals	hemp textiles	organic chemicals	power station equipment
other industrial crops	timber	silk textiles	other chemicals	household mechanical/electrical goods
vegetables		knitted goods	chemical fibres	railway equipment
fruits		other textiles	plastic articles	motor vehicles
forest products		clothing / leather goods	cement	ships
wool and hides		furniture	glass	other transport equipment
meat, eggs, milk		paper	ceramic products	other engineering products
fish		cultural / sporting goods	iron	electronic products
others		rubber manufacturers	steel	household electronics
		other building materials	non-ferrous metals	
			metal products	

Source: Zhang (2000), p. 67-69

Each of the classified industrial sectors are then analysed in regard to their sector-specific international competitive strength by applying the so-called

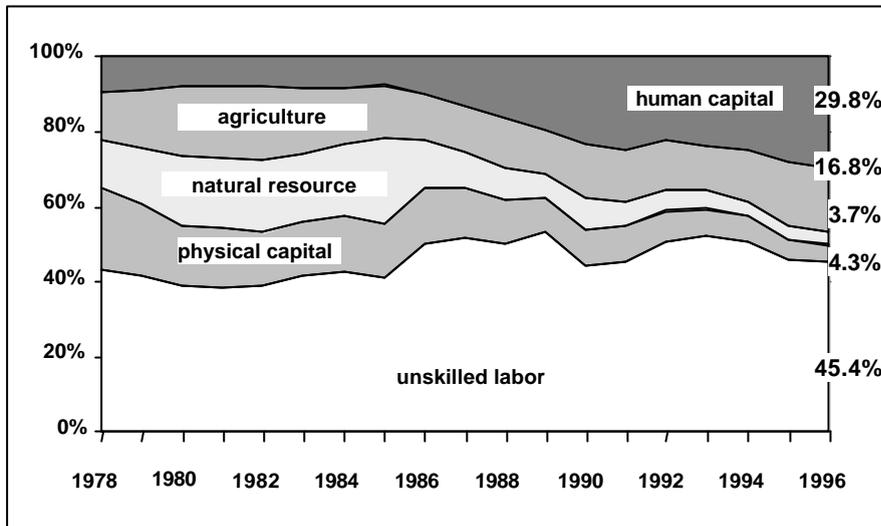
^{12[12]} Zhang (2000), p. 36-46.

net export performance ratio (NEPR) as a criteria for measurement. The NEPR indicates the sector-specific trading position of a country relative to the rest of the world and is defined as net exports of a commodity as a percentage of a commodity's world exports divided by a country's export share in world exports. In other words, the NEPR puts a country's export share of a specific commodity into relation with that commodity's overall share in world exports. A positive NEPR implies that a country is a net supplier in a specific sector with exports being larger than imports in this category; a NEPR larger than 1 implies that the share of a country's net exports in world exports of a specific sector is larger than a country's overall share in world exports. Such a result can be interpreted in a way that a country has a sector-specific competitive advantage against the rest of the world.^{13[13]}

Zhang's analysis provides further insight into fundamental trends and patterns of China's trade. First of all, an analysis of China's export structure based on the classification of tradable commodities reveals that sectors predominantly applying unskilled labor dominate China's exports with a 45.4% share (see chart 2).

^{13[13]} Zhang (2000), p. 54-64.

Chart 2: Composition of China's Exports by Commodity Type (1978-1996)

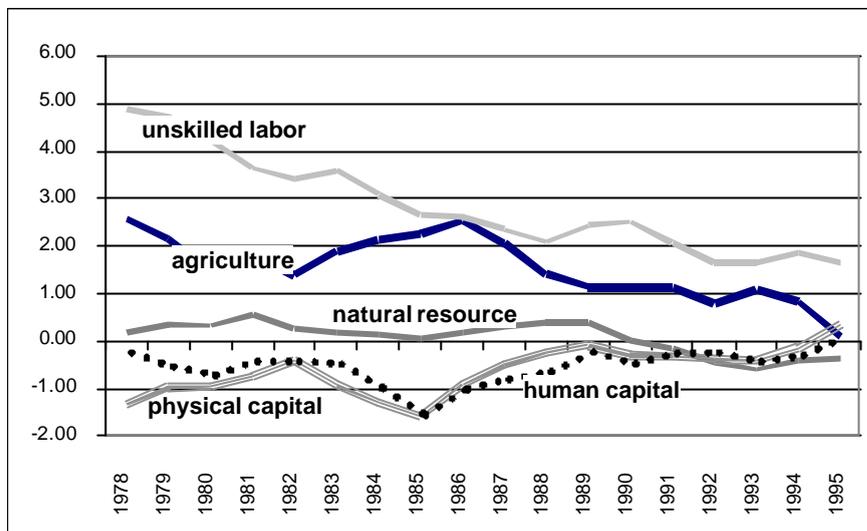


Source: Zhang (2000), p. 55

However, since the mid 1980s the class of human capital-intensive sectors has significantly increased its share to 29.8%, thereby advancing to the second most important export category. On the other hand, natural resources and physical capital-intensive sectors have diminished in their importance for Chinese exports. Further analysis of sector-specific NEPRs provides evidence for a remarkable shift in Chinese competitive advantages (see chart 3).^{14[14]}

^{14[14]} Zhang (2000), p. 70-73

Chart 3: Net Export Performance Ratio by Commodity Type (1978-1995)



Source: Zhang (2000), p. 70-73

- - China's competitive advantage is highest, though declining remarkably in unskilled labor-intensive industries like textiles, garments, toys or rubber products.
- - China's competitive advantage has diminished in agriculture and natural resource-based industries such as oil or minerals.
- - China is improving its international competitive position in selected physical capital-intensive industries like pig iron, coal products, plastic articles, cement or inorganic chemicals, and –even more remarkable- in selected human capital-intensive sectors such as household appliances, electronics, ships, energy and power generating equipment, railway equipment or agricultural machinery.

Zhang further demonstrates that China's actual competitiveness in exports as reflected in the sector-specific NEPRs is firmly rooted in distinct underlying cost- and productivity-based comparative advantages of China. He does so by applying the so-called Domestic Resource Productivity (DRP) concept that allows the assessment of a country's comparative advantage based on

the neo-classical notion of factor endowments and comparative cost or productivity advantages.^{15 [15]} A negative DRP implies a sector-specific resource- and cost based comparative disadvantage and a positive DRP indicates a sector-specific resource- and cost-based comparative advantage against the rest of the world. The higher the deviation of the DRP from zero, the bigger the comparative advantage or disadvantage. The results for China's sector-specific DRPs and their development over time provide strong evidence that China's actual, sector-specific competitive position in exports are in line with specific cost- and productivity-based advantages, while distortions caused by China's economic system are on the decline.^{16 [16]} The results reveal a declining resource-based comparative advantage in agriculture and natural resource-based industries, a strong increase in unskilled labor-intensive sectors, and a significant improvement in physical capital-intensive and human capital-intensive industries.

From the results of Zhang's study which are supported by other studies as well^{17 [17]}, it can be concluded that China's emergence as a leading export nation with a growing competitive advantage also in capital-intensive industries and manufactured goods can be explained by improvements in a sector's specific cost and productivity position. The key question is what factors initiated and facilitated these improvements. To do so, Porter's

^{15 [15]} Zhang (2000), p. 82-89.

^{16 [16]} Zhang (2000), p. 172-200

^{17 [17]} Yoshitomi, Masaru (1996). The Comparative Advantage of China's Manufacturing in the Twenty-first Century. In: Organisation for Economic Co-operation and Development (OECD). China in the 21st Century – Long-term Global Implications. P. 53.-69.

concept of national competitive advantage provides a suitable theoretical framework.^{18[18]}

3. 3. Theoretical explanations for China's growing competitiveness in industrial goods

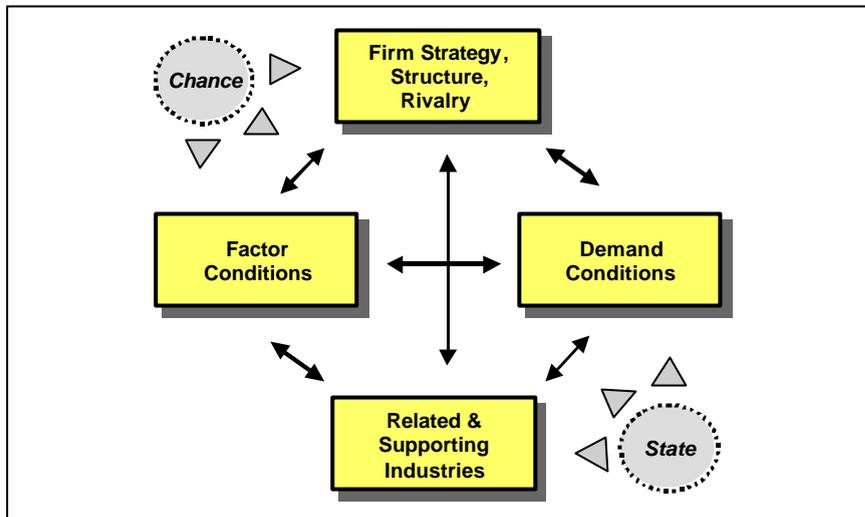
3.1. The Porter concept of "National Competitive Advantage"

A country's competitive strength in a specific industry is closely related to the characteristics of the national environment. It results to a large extent from a continued process of upgrading national competitive advantages and requires that the national environment fosters competitive improvements and innovation. According to Porter, a country's national competitive advantages is determined by a set of national attributes that shape the competitive environment for national industries and firms.^{19 [19]} Porter isolates four determinants of national competitive advantage (see chart 4):

^{18[18]} Porter, Michael E. (1990). *The Competitive Advantage of Nations*. London / Basingstoke, MacMillan Press.

^{19[19]} Porter (1990), p. 71-128.

**Chart 4: Determinants of National Competitive Advantage
(Porter's "Diamond")**



Source: Porter (1990), S. 127

- - *Factor conditions*: This attribute refers to the country's endowment with factors of production such as human resources, land, natural resources, capital, knowledge, and infrastructure. Porter discriminates among different types of factors, distinguishing basic and advanced factors (e.g. unskilled labor vs. highly educated human capital) as well as generalized and specialized factors (e.g. wide skills vs. narrowly specialized skills). Most important for national competitive advantage and long-term economic development are the endowment with advanced and specialized factors, and the rate at which these factors are created, upgraded and further specialized.
 - *Demand conditions*: The characteristics of home demand, its size and rate of growth, as well as the structure of demand, the degree of demand segmentation, and the degree of sophistication, independence and uniqueness of buyer needs have an important impact on the nature of competition, the rate and speed of investment and innovation efforts of an industry. National competitive advantages emerge as domestic demand conditions urge firms to innovate rapidly, to invest into new technologies and to enhance productivity and economies of scale and scope.

- *Related and supporting industries*: Strong supplier industries support the formation of sector-specific national competitive advantages as they produce inputs that are widely used and important to innovation. Close working relationships between world-class suppliers and industry often create a self-enforcing process of innovation and upgrading. Similarly, the presence of strong related industries that produce complementary products and services or share activities in an industry's value chain fosters co-operation and the spread of competitive advantages. Linkages between strong industries through vertical buyer-supplier relationships or horizontal, complementary relations based on shared customers, technologies or activities lead to a clustering of specific highly competitive industries in a nation.^{20 [20]} Mutually supportive industry clusters are crucial to national economic development as they uphold competitive dynamics in a nation.

- *Firm strategy, structure, and rivalry*: The context in which firms are created, organized and managed as well as the nature of domestic rivalry shapes the goals and strategic behavior of firms, their attitude towards investment and innovation, and the entrepreneurial motivations. National competitive advantages arise from the competitive context within which firms act by creating a more or less fertile environment for innovation and upgrading of skills.

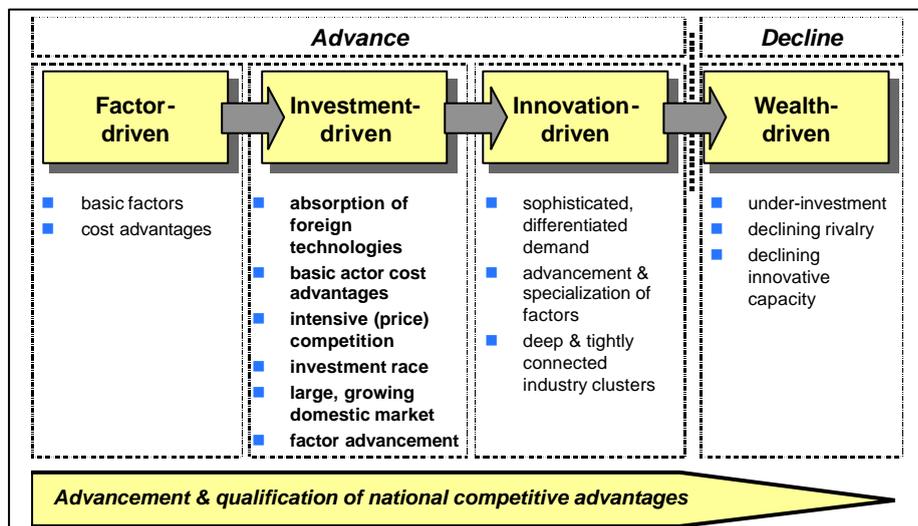
Within the Porter concept the role of the government in shaping national competitive advantage is confined to influencing the four determinants by either fostering or impeding through its policies the competitive dynamics and innovative pressures in a nation's industries.

The individual determinants combine into a dynamic, mutually reinforcing system (the “diamond”) forming distinct patterns in a country's national competitive advantages. Their interactions also determine the rate and

^{20[20]} Porter (1990), p. 148-154.

direction of upgrading advantages and the innovation process that lay the foundations for economic development and sustainable competitiveness.^{21[21]} Upgrading is essential for the competitive development of national economies as a nation moves towards more sophisticated sources of competitive advantage and towards positions in high-productivity, higher value-added industries. It requires mechanisms for continued factor creation and advancement, motivated people, intense domestic rivalry, demanding buyers that urge for upgrading, as well as a capacity for new business formation.^{22 [22]} By taking such a dynamic perspective on competitive advantage, Porter's concept allows to view nations as differing in the respective stage of competitive development due to different positions in regard to the four determinants of national competitive advantage. Porter distinguishes stages of economic development (see chart 5):^{23[23]}

Chart 5: Stages in Economic Development



Source: Porter (1990), S. 543-565

^{21[21]} Porter (1990), p. 144-148.

^{22[22]} Porter (1990), p. 560-562.

^{23[23]} Porter (1990), p. 543-560.

- *Factor-driven stage*: At this stage of economic development rich endowments with basic factors (e.g. low-cost, unskilled labor, natural resources) are the main source of national competitive advantage based on factor costs.
- *Investment-driven stage*: While endowments with basic factors are still important, domestic market conditions characterized by high growth and intensive price competition are the key source for competitive advantage. They trigger aggressive investment by firms to built-up economies-of-scale and motivate them to upgrade basic factors, to absorb and improve new (often foreign) technologies, and to seek productivity gains that enhance their cost advantages.
- *Innovation-driven stage*: National competitive advantage in this stage is derived from a strong capacity to rapidly advance process and product technologies, to differentiate by supplying specialized and sophisticated products and services that meet the needs of demanding and anticipative buyers, and to generate innovations by utilizing deep industrial clusters.
- *Wealth-driven stage*: This stage is characterized by a decline in a nation's capacity to strive for innovation causing under-investment and a deterioration of national competitive advantage.

Porter's theoretical framework seems suitable to explain (at least partially) the emergence of China as a leading trading nation with a growing competitive edge also in the field of manufactured goods and in (human) capital-intensive industries.

3.2. China at the threshold to investment-driven stage of economic development

China's emergence as an important trading partner is related to a significant transition of China's economy that, at its core, derived from the advancement and qualification of factors and from the release of domestic

competitive forces in the course of economic reforms. As a result, it can be argued that China is moving from a factor-driven stage of development towards the next stage of investment-driven economic development where national competitive advantage is shaped by domestic demand conditions and intensifying domestic rivalry. Two mechanisms are at work that serve as catalysts for factor advancement and the adoption of investment-driven strategies, and have led to the emergence of large, competitive domestic industries: 1) processing trade led by the influx of foreign direct investment, and 2) growing domestic competition and entrepreneurship due to China's enterprise reform and new business creation.

The abolishment of the state monopoly on foreign trade, the decentralization of responsibilities and increased competition among the Foreign Trade Corporations, the relaxation of controls over tradable commodities, the price reform of tradable commodities, the building of a foreign exchange market with (partial) convertibility, or the promotion of foreign direct investments by means of establishing Special Economic Zones (SEZ) are important milestones that encouraged foreign trade and investment and pushed forward China's integration into the world economy.^{24[24]} In particular, foreign direct investment (FDI) has become a major driving force in the development and transformation of the Chinese economy.^{25[25]} The surge in FDI not only helped to overcome bottlenecks in capital supply, but contributed significantly, though in a regionally unbalanced fashion, to China's technological progress, improvements in enterprise management and work

^{24[24]} Zhang (2000). p. 6-30.

^{25[25]} Li, Feng / Li, Jing (1999). *Foreign Investment in China*. Basingstoke / London, MacMillan Press, p. 9-11/204-218.

organization, to the creation of employment opportunities and income, and to the rapid growth of exports.

According to the China's Statistical Yearbook, foreign-controlled firms accounted for 14% of China's domestic production in 1998, which is equal to half of the production by state-owned enterprises (SOE). The role of foreign invested enterprises in external trade is even bigger. Since 1985 the share of foreign invested enterprises in Chinese exports has risen from a mere 1% to 40% in 1998.^{26[26]} The main driving factor for this development is the rapid surge in processing trade, whereby foreign companies either establish own manufacturing plants in mainland China or form subcontracting alliances with local partners, supply equipment and materials for processing in China, and re-export the finished goods to world markets. Led by foreign investment from Hong Kong, Taiwan, and increasingly from the United States and Japan, processing trade rapidly developed in labor-intensive, light manufacturing industries like garments or electronic components, which demand capabilities for small-lot, large-variety production, and for highly flexible, timely design and delivery on demand.^{27[27]} Initiated with the shift of manufacturing and procurement from Hong Kong to the Southern provinces of mainland China, small and highly flexible small companies mushroomed and developed into open and highly flexible, transnational subcontracting networks. Sometimes labelled the "China Circle" these networks are now an integral part of the electronics and other global industries. Although independent development efforts are

^{26[26]} Li /Li (1999), p. 214.

^{27[27]} Naughton, Barry (1997). The Emergence of the China Circle. In: Naughton, Barry (ed). The China Circle – Economics and Electronics in the PRC, Taiwan, and Hong Kong. Washington D.C., Brookings Institution Press, p. 3-37.

limited, processing trade has initiated a powerful process of technology transfer, of accumulation and upgrading of domestic manufacturing capabilities and quality in China. As a result of increasing global cost-driven competition, foreign manufacturers continue to shift production and procurement of products with more and higher value-added to China.^{28[28]} As a result, more and more assembly plants and subcontractors with world-class manufacturing practices, top-notch quality, yield levels and productivity have been established on mainland China.^{29[29]} Examples being found in plastic moulds^{30 [30]}, audio-visual and office equipment like video tape recorders or copiers, and electronic components like condensers or electric motors.^{31 [31]} Besides lower labor costs foreign manufacturers cite higher flexibility to adjust production, the possibility to run manufacturing around the full year at 24-hours-a-day, and high flexibility and fast responsiveness as important reasons for shifting production to China.^{32 [32]} In addition, facility investment cost can be reduced sharply, because many high-cost, capital-intensive and heavily automated processes can be replaced by low-cost, labor-intensive processes due to China's ample supply of low cost labor.

^{28[28]} “Ayaushi IT rikkoku – saigo no toride, sentanbuhin ga Nihon kara nigete iku” (Watch out! IT state – The last fortress, high technology parts, leave Japan). In: Nikkei Business, 17.7.2000, p. 26-40.

^{29[29]} “Mo tomaranai, haitekku buhin seisan no chugoku shifuto – Jidokasetsubiison ga manaita kudoka” (The shift of high tech parts production to China cannot be stopped – The dependence on automated production technologies invites the industrial hollowing-out). In: Nikkei Business, 27.3.2000, p. 8-9.

^{30[30]} “Kojo wa shorumu mieru kanri ga chugoku de soko” (The management principle of the factory being the showroom is succeeding in China). In: Nikkei Bu siness, 20.9.1999, p. 49-50

^{31[31]} “Daremo shiranai – Chugoku bijinesu no kachigumi” (Nobody knows the winners in China business). In: Nikkei Buiness, 27.9.1999, p. 36-49.

^{32[32]} Note: The author is well aware of the fact that despite all progress in liberalisation and economic reform, formidable obstacles like uncertainties in the legal system, limitations to the enforcement of law, bureaucratic arbitrariness, labor problems still hamper foreign trade and direct investment. Nevertheless, the achievements and progress should not be underestimated.

The growth of FDI-initiated processing trade has been accompanied by a surge in new business creation of smaller enterprises or collective or communal township and village enterprises that participated actively in export growth.^{33[33]} While the record regarding the absorption of foreign technology in case of state-owned enterprises (SOE) has received only mixed appraisal^{34[34]}, the managerial spill-over and demonstration effects for rural Chinese firms as a result of processing trade are considered to be substantial.^{35[35]} As will be shown in section 5, some of the firms have grown rapidly, have strengthened their own, independent research and development functions, and are in the process of internationalisation of their operations.

A second, though less visible and clear mechanism of factor advancement that is bringing China to the edge of an investment-driven stage of economic development relates to China's enterprise reforms. Despite the slow and time-consuming process and the load of remaining problems, particularly in regard to the reform of the large, state-owned enterprises, significant progress in market and enterprise reform has led to increasing domestic competition.^{36[36]} Initial reform initiatives succeeded in shifting from a centrally planned material allocation system to a increasingly market-based system of decentralized contracting, while the price liberalisation measures and the permission of market entry by non-state firms have resulted in increased competition on product markets. This process can be divided into

^{33[33]} Zhang (2000), p. 54-56.

^{34[34]} For empirical studies, see: Shen, Xiaobai (1999). *The Chinese Road to High Technology – A Study of Telecommunications Switching Technology in the Economic Transition*. Basingstoke / London, MacMillan Press; Shi, Yizheng (1998). *Chinese Firms and Technology in the Reform Era*. London, Routledge.

^{35[35]} Chan / Tracy / Wenhui (1999), p. 25-32.

^{36[36]} Note: The author is, again, aware of the many remaining obstacles and problems that are slowing down reform, particularly in regard to privatisation, management accountability, corporate governance, and the restructuring of large SOEs.

two phases:^{37[37]} 1) the pre-1989 period characterized by growing market size and rapid entry, and 2) the post-1989 period featuring a rising level of industry concentration and scale economics. During the 1980s China saw a rapid entry of the non-state sector into most manufacturing industries, stimulated by a fast growing market demand and the existence of geographically fragmented, underdeveloped rural markets. Many small firms, township and village enterprises emerged, heavily concentrating on manufacturing of building materials, machinery (e.g. home appliances), textiles, and foodstuffs. However, due to the fast growing, though highly fragmented market demand, plant scales of production remained below minimum efficient capacity causing diseconomies of scale. Since the recession of the late 1980s, these diseconomies are in the process of correction, by creation of economies-of-scale and by an increase in industry concentration ratio. This process increases the competitive pressures on firms, enforces structural change and leads to a selection of strong, financially sound “winners” and weak, loss-making “losers”, which can often be found among the large SOEs. It is supported by government policies to promote mergers, industrial groups and amalgamation of plants, while at the same time encouraging SOEs to spin-off non-core business units and plants, thereby fostering the emergence of private firms.

Progress in regard to enterprise and ownership reform was slower and achieved through a series of small, modest steps, as the Chinese government resisted the temptation of full-fledged privatisation of its SOEs.^{38 [38]}

^{37[37]} Zhang, Jun (2000). Market Size, Scale Economics and Loss-Making in China's Post-Reform State Manufacturing Industry. In: *East Asian Review*, March 2000, p. 3-27, here p. 15-24.

^{38[38]} For details see: Liu, Minquan (2000). Capitalist Firms, Public Enterprises: Ownership Reform and Privatisation of Chinese State-owned Enterprises. In: Cook, Sarah / Yao, Shujie / Zhuang, Juzhong (eds.).

Enterprise reform was approached from two sides: 1) as part of the policy of “grasping the large and let go of the small” mainly the large and very large SOEs in selected industries received continued protection and support, while the survival of smaller SOEs was left to increased competition with communal and collective township and village enterprises, and private firms. At the same time, the government engaged 2) in various measures of enterprise reform in order to improve SOE management, to enhance productivity, and to accelerate structural change in industries. Most notable are attempts of management reform focusing on increased managerial accountability and autonomy in decision-making regarding production, investment, marketing, personnel and the like (e.g. contract responsibility system, director responsibility system), and on improvements of incentive schemes for managers and employees (e.g. internal contract system). In addition, recent measures to diversify ownership forms (e.g. stock ownership by managers, joint stock companies) and forms of corporate finance (e.g. SOE listing on foreign stock exchanges)^{39[39]} need to be mentioned. In combination, these modest steps in enterprise reform have led to a spread in modern management practices based on stricter financial control, more transparent responsibilities, as well as cost and quality consciousness. While

The Chinese Economy under Transition. Basingstoke / London, MacMillan Press, p. 35-63; Nolan, Peter / Xiaoqiang, Wang (2000). Reorganizing Amid Turbulance: China’s Large-scale Industry. In: Cook, Sarah / Yao, Shujie / Zhuang, Juzhong (eds.). The Chinese Economy under Transition. Basingstoke / London, MacMillan Press, p. 9-34; Child, John (2000). Management and Organization in China: Key Trends and Issues. In: Li, J.T. / Tsui, Anne S. / Weldon, Elizabeth (eds.). Management and Organization in the Chinese Context. Basingstoke / London, MacMillan Press, p. 33-62; Kueh, Y.Y. (1999). Economic Reform in Chinese Industry: Efficiency and Instability. In: Kueh, Y.Y. / Chai, Joseph C.H. / Fan, Gang (eds.). Industrial Reform and Macroeconomic Instability in China. Oxford, Clarendon Press, p. 3-19; Readjustment of the Managerial and Organizational Structure of Chinese Enterprises. In: Kueh, Y.Y. / Chai, Joseph C.H. / Fan, Gang (eds.). Industrial Reform and Macroeconomic Instability in China. Oxford, Clarendon Press, p. 31-45.

^{39[39]} “Chugoku no ootokokuyu kigyō – Kaigai de oogata shikin chotatsu” (China’s large state-owned enterprises procure large-scale funds on overseas capital markets”. In: Nihon Keizai Shimbun, 28.9.2000, p. 7.

private firms are taking the lead in management reform, state-of-the-art management practices are increasingly implemented also among state-owned firms and have resulted in the emergence of excellently managed, highly entrepreneurial large SOEs.^{40[40]}

The two mentioned mechanisms of factor advancement, processing trade and enterprise reform, are mutually reinforcing each other and have created a powerful process of new business formation, rapid market expansion and increased domestic rivalry among different firms and business formats. Through internationalisation foreign management know-how is absorbed also by domestically oriented firms, while large and rapidly growing domestic markets, particularly in consumer goods, are developing, thereby encouraging strategies of aggressive investment and market entry by newly created firms. Backed by China's considerable pool of technical engineers and its growing number of qualified employees, the conditions for an investment-led process of economic development are emerging under which national competitive advantage is more and more shaped by domestic demand and market conditions as well as improvements in factor skills. In the following section it will be shown in which industries these developments are most visible.

4. 4. Emergence of competitive Chinese industries and firms

A key ingredient for gaining national competitive advantage during the investment-driven stage of economic development is the emergence of large,

^{40[40]} Child (2000), p. 45-46; "Daito suru chugoku shiei kigyo – Hinshitsu kosuto kanritettei" (Emerging private Chinese firms – Enforcing quality and cost control management). In: Nihon Keizai Shimbun, 4.7.2000, p. 10.

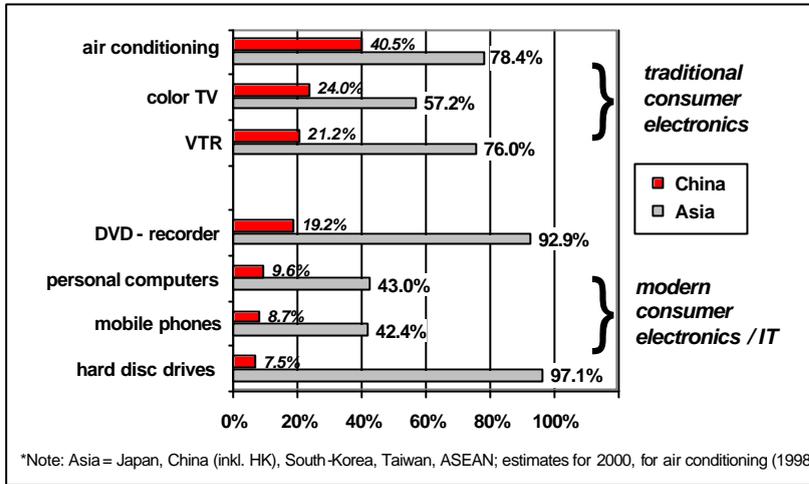
rapidly growing domestic markets characterized by a high potential for economies-of-scale and by intense domestic competition. An increasing number of industries in China, both in light, labor-intensive as well as in heavy, (human) capital-intensive industries, are showing these patterns of demand-driven industrial expansion and are producing a growing number of highly competitive and entrepreneurial firms.

4.1. Emerging Chinese firms in light, labor-intensive manufacturing industries

China's large-scale, fast growing consumer goods industry is probably the best example for the increasing international competitiveness of Chinese firms in manufacturing. Within a decade, China has emerged as a leading producer and market for durable consumer goods and commands a leading share in products like transportation equipment (e.g. motorcycles), home appliances (e.g. refrigerators, washing machines, air conditioners), audio-visual equipment (e.g. television, video tape recorders), information processing and communication equipment (e.g. personal computers), and the supporting supplier industries (e.g. electronic components). China is already the largest producer of air conditioners and color TVs, but is also rapidly expanding its share in modern consumer electronics and information technology (IT) goods such as mobile phones, hard-disc drives and DVD recorders (see chart 6).^{41[41]}

^{41[41]} "China becoming IT powerhouse". In: Nikkei Weekly 31.7.2000, p. 21.

Chart 6: Chinese world production share in selected consumer goods*



Source: Nikkei Weekly, 31.7.2000

China is also likely to quickly emerge as the world’s largest market for mobile communication and Internet services, thereby further pushing ahead IT-related manufacturing industries. China already boasts more than 60 million subscribers of mobile telephones, making it the second largest market after the United States^{42[42]}, and the number of Internet users is expected to increase from 600.000 in 1997 to 20 million by the end of 2000, and to 300 million by 2005.^{43[43]} As an anticipation of these developments, the Zhongguancun district in Beijing is already drawing the attention of the global information technology industry as a world-class manufacturing and R&D base for IT products and software, and has attracted the investment by

^{42[42]} “Chugokutsushinsangyo – Keitaikenhiki kyukakudai” (China’s telecommunication industry – Rapid expansion led by mobile phones“). In: Nihon Keizai Shimbun, 22.6.2000, p. 8.

^{43[43]} Jin, Jian Min (2000). Chugoku no netto sangyo (China’s Internet industry). In: FRI News Letter, No. 55, March 10, 2000.

leading multinationals like Microsoft Corp. or Intel Corp. to seek access to the vast pool of highly qualified, but low cost engineers.^{44[44]}

While foreign companies may have initiated these market dynamics by means of processing trade, a number of highly competitive Chinese firms, many of them still state-owned, has emerged, the most known companies being Haier, TCL, Konka, Midea, Chunlan in the field of home appliances and consumer electronics, Legend, Founder and the Stone group in the field of computers and software, and Quingqi, Sundrio, and again Chunlan in the field of motorcycles and light trucks. The common features of these firms are modern, state-of-the-art management practices in finance, marketing, human resource management, etc., a world-class manufacturing base with strong quality orientation, and an aggressive investment and brand-oriented marketing strategy targeting global markets.

Consumer electronics

The Chinese TV industry, for example, produced almost 35 million color TV sets in 1998, equal to about 24% of world production, and recorded an average annual growth rate of 13% since 1992. In 1999, production grew by 21.9% to 42.6 million units.^{45[45]} The lion's share of production is for the domestic market with only 9% going into exports. With only a 3% share of imports and a market share of 15% by foreign-invested firms, the industry is dominated by Chinese firms commanding a 82% market share.^{46[46]} The

^{44[44]} "Ground zero for China's IT explosion". In: Nikkei Weekly, 26.6.2000, p. 24.

^{45[45]} "Kara terebi de karuteru" (Cartel in color TC industry). In: Nihon Keizai Shimbun, 13.6.2000, p. 7.

^{46[46]} Ohhara, Moriki (2000). Chugokukigyo no kaigaishinshutsu / Kaden, otobai meka no jirei kara (Foreign expansion by Chinese firms – Examples from the home electronics and motorcycle manufacturers). In: Ajiken World Report, No. 56, 5/2000, p. 28-34, here: p. 30;

Chinese TV industry developed rapidly during the 1980s and in 1989 over 90 manufacturers crowded the market. The recession of 1989 as well as countermeasures by the government to curb the overheated demand resulted in substantial overcapacity and increased price competition.^{47[47]} Nowadays, the industry is consolidating and building up scale economics with the top 3 firms, Haier, TCL, and Konka holding a more than 40% market share.^{48[48]}

A similar situation prevails in the air conditioning industry. With a production of 8.5 million sets in 1997 China has a dominating 41% share of world production.^{49[49]} The industry grew at an average annual rate of 40% since 1992 driven by domestic demand that consumes 81 % of production. Chinese firms dominate the market with a 70% market share. Although Japanese-Chinese joint ventures like Shanghai Hitachi, Shanghai Sharp or Shanghai Mitsubishi rank among the top 5 manufacturers, Chinese firms hold a 70% share of the market and the two Chinese firms, Haier (27%) and Midea (9%), are the dominating market leaders.^{50[50]} The same is true for other industries in the field of home appliances like refrigerators, washing machines, or electric fans, as well as in the field of audio-visual equipment.^{51[51]} These industries are suffering from extensive overcapacity causing aggressive price competition, but with maturing demand, product quality and brand image are increasingly becoming important parameters for competition.

^{47[47]} Marukawa, Tomoo (1999). Chugokusangyo kenkyunyumon / Kaisetsu to deta (Introduction to research on Chinese industry - Interpretation and facts). Ajia Keizai Kenkyujo (Institute of Developing Economies), Tokyo, p. 128-131.

^{48[48]} "Kaden uriage rankingu" (Ranking of home appliance turnover). In: Chugokujoho, Mitsubishi Research Institute, Vol. 16 No. 1, April 2000, p. 50.

^{49[49]} Marukawa (1999), p. 122.

^{50[50]} Ohhara (2000), p. 30.

^{51[51]} Marukawa (2000), p. 121-127.

The Haier Group is one of China's most outstanding companies and top brand in durable consumer goods manufacturing over 9,000 products in 42 product categories such as home appliances (e.g. refrigerators, washing machines, air conditioning, micro-waves) and electronic consumer products (e.g. TVs, video tape recorders, personal computers, laptops, telephones). Haier is a large, state-owned enterprise with a sales turnover of about \$3.2 billion and more than 20,000 employees. Founded in 1984 as the Qingdao Refrigerator Factory the company started with 800 employees importing refrigerator production technology from Germany.^{52[52]} The Haier Group has achieved its dominant market position due to strenuous efforts in manufacturing and quality improvements and due to aggressive investment into a direct sales and service network of about 20,000 outlets.^{53[53]} Haier's development can be divided into three stages. After building a brand image throughout the 1980s in refrigerators by implementing total quality control management (e.g. ISO 9001 certification in 1992), it rapidly diversified into new product areas in the field of consumer durables, electronic consumer goods and information processing and communication technologies throughout the 1990s. Since 1996 Haier seeks to become a global player by aggressively expanding into overseas markets and targets to enter the top 500 list of Fortune magazine at the beginning of the next century. Exports account for 10% of sales turnover, but Haier already enjoys double-digit market shares and a well-established brand recognition in the United States, Southern Europe and the Middle East, particularly in the field of small- and medium-sized refrigerators and air conditioners. Since 1996, Haier has

^{52[52]} For company profile see: <http://china.haier.com>

^{53[53]} “Kokunai shijo seishi – senshinkoku ni shojun” (Dominating the domestic market – Targeting industrialized countries). In: Nihon Keizai Shimbun, 31.7.2000, p. 7.

established manufacturing plants in Indonesia (1996 for washing machines), in the Phillipines (1997 for refrigerators), in Malaysia (1997 for washing machines), in Iran (1998 for washing machines).^{54[54]} In March 2000, Haier opened its first production facility for compact refrigerators in the United States, where it commands a 20% market share in small- and medium-sized refrigerators. The plant has an annual manufacturing capacity of 300.000 units. Further manufacturing sites are planned for Italy, Ukraine, and Angola. The development of the Haier group has received increasing worldwide attention supported by articles in well-known publications like the Financial Times and Fortune magazine. Haier's efforts to become a truly multinational electronics company are supported by increased, independent efforts in research and development.

TCL and Konka are similar cases in the field of consumer electronic products like TV and video tape recorders, and Chunlan or Midea in the field of air conditioners and house appliances.

Incorporated in 1980, TCL is a state-owned company with 20.000 employees and an annual sales turnover of \$1.8 billion in 1999.^{55[55]} The company started as a manufacturer of electrical components (e.g. switches, sockets) and communication equipment (e.g. telephones, pagers), but from the mid 1990s entered into audio-visual equipment like TV and video tape recorders, and from 1999 on into white goods like washing machines.^{56[56]} TCL has grown rapidly at an average annual rate of 50% during recent years

^{54[54]} Ohhara (2000), p. 32-33.

^{55[55]} For company profile see: <http://www.tcl-elec.com>

^{56[56]} "Keie isha ga risuku seoi koritsuka tsuikyū" (Management takes risk and pursues efficiency). In: Nikkei Business, 23.10.2000, p. 14.

and commands the top market share of 18.3% in China's TV market by selling more than 2.7 million TV units in the first half of the year 2000. TCL's market success is based on its direct sales strategy and strong brand image. TCL initially entered the TV market without own production facilities, but procured from OEM subcontractors. Instead it invested heavily in building up a direct sales and service network, where still more than half of the staff is employed. Although the company is still state-owned, management is independent from interference from the state, and managed its rapid expansion on its own risk without additional funding from the government. It is the objective of TCL to become a multinational electronic company with a global presence and strong own R&D base. It has established extensive and direct distribution network around the world with offices in the United States, Russia, Singapore, Vietnam, etc..

Established in 1979, Konka Group is the first Sino-foreign joint venture in electronics in China.^{57 [57]} With 9.000 employees and an annual sales turnover of over \$1 billion (1997), Konka is one of the 500 biggest industrial enterprises in China, and engages in the production of audio-visual equipment like TV, video tape recorders and DVD recorders, as well as home appliances and telecommunication equipment. Listing its shares on the Shenzhen stock market in 1991, Konka grew rapidly to become one of China's top manufacturers with an annual output of over 4.5 million TV sets, over 1 million video tape recorders, and of 1 million phone sets. Its success is based on an excellent brand image for high product quality and design, being the first Chinese TV manufacturer to obtain ISO9001 certificate for its quality management system. Konka started to expand to overseas markets

^{57[57]} For company profile see: <http://www.konka.com>

already in 1985 and is now China's leading exporter of TVs with export sales of about 2 million sets per year to South and North America, Europe and Southeast Asia. In January 2000, Konka drew worldwide attention in the electronics industry when it received as the first Chinese company the "Best Design" prize during the world's largest electronics fair "International Consumer Electronics Show" in Las Vegas beating competition from the United States and Europe.^{58[58]}

Chunlan is one of the most remarkable Chinese state-owned company ranking among the Top 5 largest Chinese enterprise groups.^{59[59]} Until the mid 1980s, Chunlan was a small, loss-making manufacturer of refrigeration machinery, but over the last 15 years transformed itself into a rapidly growing, highly profitable and highly diversified manufacturing conglomerate with \$2.2 billion sales turnover and \$121 million profit before tax.^{60[60]} Chunlan ranks among the leading general consumer electronics manufacturers with high market shares in air conditioners and refrigerators, has started to produce washing machines, televisions and personal computers, and has aggressively diversified into transportation equipment like motorcycles and light trucks, as well as into electronic components like semiconductors. Chunlan is structured as a holding company with five direct subsidiaries including consumer electronics, transportation equipment, electronic components, as well as a strong domestic marketing and trading subsidiary and an international operations subsidiary. These subsidiaries are managed and controlled at arm's length and operate a network of 42

^{58[58]} "Daito suru sangyotaiokoku - WTO kamei, shijo ni chiho" (The emerging industrial giant – The market is gaining ground with WTO membership). In: Nihon Keizai Shimbun, 18.8.2000, p. 1.

^{59[59]} For a company profile see: <http://www.chunlan.com>

^{60[60]} "China firm turns heads with winning strategy". In: Nikkei weekly, 31.1.2000, p. 19.

affiliates under them including manufacturing plants, R&D facilities and marketing companies. Chunlan stands out among other Chinese conglomerates as it pursues a corporate strategy based on own development independent from foreign technology by investing 4% of turnover in R&D. It also places strong emphasis on upgrading its manufacturing capabilities and product quality by relying mainly on in-house manufacturing of core parts such as compressors, electronic components and engines. In regard to diversification, Chunlan carefully selects niche markets in an attempt to avoid price competition with established manufacturers. For instance in the motorcycle industry, the company has concentrated on over 100cc-models where competition is less fierce, and in the truck market it focuses on vehicles equipped with special fixtures and container trucks. Chunlan is also aggressively expanding abroad and exports amount to 10% of sales, mainly to developing markets in Asia, South America and the Middle East. However, it has recently expanded its sales and service network into Western markets making inroads into the American market for air conditioners under its “Starway” brand, and into the European motorcycle market.

Midea is the world’s largest manufacturer of electric fans and China’s second largest supplier of air conditioners with an annual sales turnover of over \$1 billion and a 10% export ratio in 1999.^{61[61]} Founded in 1968 it was incorporated as a public listed joint stock company in 1993. The company grew rapidly by means of mergers and acquisitions and through tie-ups with well-known Japanese home appliance and electronics manufacturers like Matsushita, Toshiba, Sanyo and NEC, thereby expanding its business from

^{61[61]} For company profile see: <http://www.chinamd.com>

its traditional electrical fan business into air conditioners, heaters, microwave ovens, etc.. Midea has been actively engaging in management reform by introducing a business unit system in 1997 and employee stock ownership in 1999.

Personal Computers

China's semiconductor industry is still 2-3 generations behind foreign technology, highly fragmented and too small in scale, and therefore depends heavily on imports and local manufacturing by foreign-invested companies like Motorola or NEC despite to meet rapidly growing demand.⁶²^[62] However, it succeeded in overcoming foreign dominance in the personal computer market with the emergence of fast growing, highly competitive Chinese manufacturers like Legend, Founder, Great Wall or Stone.⁶³^[63] In China's rapidly growing PC market estimated at about 6.8 million units in 1999, Legend (21.5%) and Founder (8.4%) managed to grab the top market shares away from long-time leading vendors from the United States, Taiwan and Japan.

Founded by 11 engineers in 1984 as a spin-out of the Chinese Academy of Science, Legend is a child of the entrepreneurial climate in Beijing high-tech district Zhongguancun and its abundant human resource base of well-educated technicians.⁶⁴^[64] It still is a state-owned enterprise with a 60% share by the Chinese Academy of Science, but 40% are held by management

⁶²^[62] Marukawa (1999), p. 95-96.

⁶³^[63] „Ground Zero for China's IT explosion“. In: Nikkei Weekly, 26.6.2000, p. 24; Huchet, Jean François (1997). The China Circle and Technological Development in the Chinese Electronics Industry. In: Naughton, Barry (ed). The China Circle – Economics and Electronics in the PRC, Taiwan, and Hong Kong. Washington D.C., Brookings Institution Press, p. 254-285, here: p. 256 -257.

⁶⁴^[64] For a company profile see: <http://www.legend-holdings.com>

and employees. Legend began as a monopolist distributor of foreign-branded computers and computer peripherals, but with the establishment of a number of joint ventures in Hong Kong and the Shenzhen special economic zone quickly integrated into the world's electronics industry.^{65[65]} Hong Kong Legend, its listed Hong Kong joint venture more than quadrupled its annual sales turnover since 1996 reaching HK\$ 17.5 billion in 1999, while reporting even high growth in profits. While its monopolistic position for the distribution of foreign branded computers in China has been a major source of revenue, the integration of Legend as a design and manufacturing company within the global electronics industry ("China Circle") has been the key contributor to growth and profitability. In 1989, Legend began with the design, manufacture and distribution of motherboards in Hong Kong as well as started to provide systems integration products and services for large corporate and government clients in China. In 1990, Legend began the design, manufacture and distribution of its own line of PCs under the Legend brand, and in 1994 started the manufacturing of printed circuit boards. Since 1997, Legend computers are the No. 1 selling brand in China and in 1998 the one millionth Legend computer left the production line, symbolising the fast development of China's information technology industry. In fact, Legend is now one of the leading computer brands in the Asia Pacific region and the largest PC maker in Asia outside Japan with a 9.1% production share.^{66[66]} While PCs account for over half of the turnover, Legend is offering a full range of hardware, software, components (motherboards), accessories as well as system integration, application and Internet-related services. Much of Legend's success is due to open access to, and integration

^{65[65]} Naughton (1997), p. 27-28

^{66[66]} „Ground Zero for China's IT explosion“. In: Nikkei Weekly, 26.6.2000, p. 24

with, international markets, since the company still relies heavily on the import and assembly of key components and access to foreign technology. Nevertheless, its efforts to upgrade its manufacturing capabilities, product quality, as well as own research and development efforts have strongly contributed to Legend's growing international reputation as a leading, multinational manufacturer of information technology. Above all, Legend is recognized as a company that has adopted best management practices and operates almost completely like a private enterprise independent from state interference. The management organization at Legend is, like that of Founder or Stone, an example for a modern form of governance in China that balances state ownership with managerial autonomy and non-bureaucratic practices.^{67[67]} These high tech enterprises have emerged by transfer of scientific staff and advanced technologies from public institutions, but management has secured commercial freedom and the ability to formulate and execute their own strategies almost independently as long as the business and technology targets are achieved. The public owners claim fees rather than ownership rights as payments and surpluses are basically re-invested as retained earnings. Furthermore, access to global capital markets, for instance by means of listing on international stock markets, puts these firms under growing pressure for transparency and performance.

Motorcycles

The Chinese motorcycle industry is another example for a rapidly growing domestic industry that has nurtured highly competitive manufacturers that nowadays seek to expand globally. The advance of China's motorcycle industry follows the typical pattern of national development. By first

^{67[67]} Child (2000), p. 43-44.

accommodating to a huge, underdeveloped market that could not yet afford automobiles, it succeeded to establish scale economics and large, efficient producers that now seek expansion on overseas markets. The Chinese motorcycle industry increased its production by more than ten times since 1985 and produced 10 million units in 1997, thereby accounting for an estimated 50% of global production.^{68[68]} Driven by domestic demand that consumed 99% of the production, the industry grew rapidly at an average annual rate of 28%. Since the beginning of economic reforms, the number of motorcycle manufacturers increased from 20 to 130 in 1996 backed by buoyant demand. While price competition remains a strong feature of the industry, competition is more and more driven by factors like service capabilities, brand image and product reliability.

The Qingqi Group is China's largest manufacturer of motorcycles with an annual production capacity of 1.8 million units and a top selling brand "Mulan".^{69[69]} Like most Chinese motorcycle manufacturers, Qingqi relied on technical licensing from Japanese suppliers (Suzuki Motors) and in the 1990s engaged in Sino-Japanese manufacturing joint ventures. However, the company developed own brands in lower class segments by upgrading its manufacturing capabilities and establishing strong service networks. In 1994 it was the first Chinese motorcycle manufacturer that received the ISO9001 certification for manufacturing quality management. Qingqi started exports in 1988 and now operates sales subsidiaries in 6 countries (Hong Kong, Pakistan, Sri Lanka, Myanmar, Rumania, Uganda).^{70[70]} In 1997, Qingqi opened its first overseas manufacturing plant in Pakistan, followed in 1998

^{68[68]} Marukawa (1999), p. 117-119.

^{69[69]} For a company profile see: <http://china-qingqi.com>

^{70[70]} Ohhara (2000), p. 33-34.

by a manufacturing subsidiary in Lithuania. In these plants motorcycles are assembled based on the principle of complete knock-down (CKD) manufacturing. Quingqi exported about 11.000 motorcycles, thereby accounting for 60% of all Chinese motorcycle exports, and its export share of sales turnover reached 30% including exports of components for CKD assembly. While Quingqi has a strong market position on its domestic market due to high brand recognition and a strong sales and service network, its position on international markets is still weak as compared to the Japanese brands from Suzuki, Honda, Yamaha or Kawasaki. Nevertheless, large economies of scale and continued efforts to upgrade manufacturing, development and quality management capabilities represent the company's strong potential for advancement on the global market scene. Other Chinese firms like Hainan Sundiro Motorcycle Corporation^{71[71]}, one of China's "Big Three" in the motorcycle industry, may well follow suit.

4.2. Emerging Chinese firms in heavy, (human) capital-intensive manufacturing industries

Compared to the rapid growth and growing global competitiveness of China's light, labor-intensive manufacturing industries like consumer electronics, durable home appliances and electronic components, scale- and (human) capital-intensive heavy industries are considered to lack international competitiveness due to low quality, low productivity and high cost. After all, these industries are at the heart of China's ailing state-owned sector suffering from diseconomies of scale, industry-wide overcapacity, low productivity and operational inefficiency, massive debt due to widespread soft-budgeting practices, and above all from excess employment

^{71[71]} For a company profile see: <http://www.sundiro.com>

and huge social obligations such as pension liabilities, social security payments, or housing and education costs.^{72[72]} Much of the success of China's economic reforms and open-door policy as well as China's social stability depend on the successful restructuring and revitalization of China's state-owned sector, but it must progress in a socially acceptable way. On the other hand, China's past investments into human capital and technology and its technical intelligence in heavy manufacturing represent hidden potentials for scale economics and quality improvements to generate future growth by correcting past misallocations of resources.^{73[73]} Despite the many structural deficiencies in China's huge, state-dominated heavy industries, progress is made and a number of well-managed, competitive firms are emerging particularly in the steel, shipbuilding, oil-refining and machinery industry.

Iron and steel

Since 1996, China is the world's largest producer of crude steel with an annual output of 123 million tons and a global production share of 15.7% in 1999.^{74[74]} As China is also the largest producer of coal with an output of almost 700 million tons in 1997, China has basically the potential to be a self-sufficient steel producer.^{75[75]} However, further analysis reveals a fundamental quality problem that results in high dependence of China on

^{72[72]} For details see: Jian, Min Jin (2000). Chugoku no kigyokaiku to kopreto gabanansu (Corporate restructuring and corporate governance in China). In: FRI Review Vol. 4, No. 2, April 2000, p. 47-65; Nolan / Wang (2000), p. 9-34; Liu (2000), p. 35-63; Nyaw, Mee-Kau (1999). Readjustment of the managerial and organizational structure of Chinese enterprises. In: Kueh, Y.Y. / Chai, Joseph C.H. / Fan, Gang (eds.). Industrial Reform and Macroeconomic Instability in China. Oxford, Clarendon Press, p. 31-45.

^{73[73]} Yoshitomi (1996), p. 66.

^{74[74]} For details refer to homepage of the International Iron and Steel Institute under <http://www.worldsteel.org>

^{75[75]} Marukawa (1999), p. 56-59.

imports of high quality steel and iron ore.^{76[76]} Although China produces about 250 million tons of iron ore, only about 30% are suitable for melting in modern blast furnaces. To meet production targets, China imports about 45 to 50 million tons of iron ore. Despite strong efforts to modernize its manufacturing technologies such as investment into continuous casting, China still mainly produces low value-added steel products like bars, but lags behind the world's top steel producers from Japan, Korea, United States or Germany in higher quality steels like rolled sheets or stainless steel, as well as in regard to semi-finished and finished steel products. It is assumed that still only 20% of China's steel output meets international quality standards. Therefore, China still imports about 10 million tons of high quality steel annually.

The main reason for this situation is China's highly fragmented industry with hundreds of small, inefficient producers that lack cost-efficient economies-of-scale and modern, integrated steel making technology. At the same time, a small number of world-class steel manufacturing companies have emerged that are aggressively expanding exports and have developed into formidable competitors on world markets. Presently there are 4 Chinese steel producers that rank among the top 30 producers in the world, each of them possessing an annual production capacity of over 6 million tons thought to be the minimum requirement for highly efficient steel manufacturing.

^{76[76]} Marukawa (1999), p. 75-77; for a detailed analysis of China's iron and steel industry refer to: Gang, Ye (2000). *Chugokutekkogyohatten no kozohendo* (The growth of iron and steel industry in China). Yostsuya Round Publishers, Tokyo.

Among them, China's largest and the world's 7th largest steel maker, the Shanghai Baogang group, is considered to be one of the most competitive steel firms in the world with an annual output of 16.7 million tons (1999).^{77 [77]} The predecessor of Shanghai Baogang group, the former Baoshan Iron & Steel Corporation, was established in 1978 and fostered as a model factory under the Chinese government policies to modernize its iron and steel industry. In 1998, it absorbed the Shanghai Metallurgical Holding Corporation and the Meishan Iron & Steel Corporation and was renamed into Shanghai Baogang group. The group with 14,500 employees reported an annual sales turnover of \$3 billion and a 50% increase in net profits to \$180 million for 1999.^{78 [78]} Exports amounted to 1.56 million tons or about 9% of the output and are mainly targeted to other Asian countries. In March 2000, the aggregated exports of rolled steel topped 10 million tons worth over \$3 billion, and Baogang has emerged as a strong competitor for large-scale international projects winning, for instance, oil and gas line projects in Russia, Israel, India, Sudan, and Venezuela.^{79 [79]} However, it is not merely the size of the group that is drawing the world's attention, but increasingly the technological capabilities, and the growing share of higher value added, high quality products. The Shanghai Baogang group is a comprehensive steel producer offering a full range of steel products with various specifications such as high grade steel sheets for automobiles, oil tubes and pipes, plates for shipbuilding, stainless steel, electrical steel, steel bars for construction, as well as tin plates, silicon steel and other high tech, high value added products. The group has continued to invest heavily into the most modern steelmaking technologies, often based on licensing agreements

^{77 [77]} For a company profile see <http://www.baosteel.com>

^{78 [78]} <http://peopledaily.co.jp/english/200001/28/eng20000128X102.html>

^{79 [79]} http://peopledaily.co.jp/english/20004/06/print20000406_38382.html

and technical co-operations with leading foreign manufacturers like Nippon Steel. Its manufacturing sites are considered to be global state-of-the-art and have attained ISO9001 certification. Equally intensive are its efforts in research and development that have resulted in a range of newly developed products such as O5 surface deep drawing sheet, high strength structure steel, fingerprint-resistant galvanized steel sheet and high strength steel for tubing and casing.

Shipbuilding

A similar situation prevails in the shipbuilding industry. In 1999, China became the third largest shipbuilding nation after South Korea and Japan, accounting for 10.4% of the order intake.^{80[80]} However, like the iron and steel industry, the industry is widely fragmented and crowded by more than 500, mostly small-scale shipbuilders.^{81[81]} Similar to other state-dominated industries, the industry as a whole suffers from overcapacity, high cost manufacturing due to inefficient cost control management, limited technological capabilities, as well as excess employment.^{82[82]} Due to a lack of large scale, heavy duty shipyards, China's shipbuilders have mainly concentrated on building smaller size, low value added ships like bulk transporters which meet domestic demand for coastal and river transportation, while having only limited capabilities to built large size or special purpose, high value added ships like multi-purpose ocean container

^{80[80]} Lloyd's Register (2000). World Shipbuilding Statistics

^{81[81]} „Schiffsbau in der VR China spürt Wirkung der asiatischen Finanzkrise.“ In: bfai – Länder und Märkte. Bundesstelle für Außenhandelsinformationen (bfai), 25.1.1999.

^{82[82]} Nakatsuka, Seiji (2000). Henbo suru sekai no zosensangyo no suii to tenbo (Trends and prospects for the changing global shipbuilding industry). Kaijisangyokenkyujo, Tokyo, 5.4.2000.

carriers, very large and ultra-large crude carriers (VLCCs, ULCCs), LPG tankers or passenger cruising ships.^{83[83]}

However, next to a growing importance as an international repair site for ships, the Chinese shipbuilding industry drew worldwide attention when in the beginning of 1999 news spread of a large scale order by the Dalian New Shipyard received from Iran to built 5 ULCC vessels in the class of 300,000 DWT (deadweight tons).^{84[84]} The order symbolizes the efforts by the Chinese government to upgrade its international competitiveness by reorganizing the industry and by investing heavily into the modernization and expansion of its capacities. The investment and modernization strategy focuses on the 3 leading shipbuilding groups, the China State Shipbuilding Corporation (CSSC) under central state control with three large shipyards in Shanghai (100,000 DWT), Jiangnan (100,000 DWT) and Hudong (80,000 DWT), the CISC group with three large shipyards in Dalian (New Dalian with 300,000 DWT and Dalian with 80,000 DWT) and Tianjin (80,000 DWT), and the GSI group in Guangzhou (60,000 DWT). At present, 6 large-scale shipyards with a capacity between 150,000 to 700,000 DWT are under construction implying a significant increase in China's capability to built modern, large crude carriers. In particular, the completion of the new shipyard of the CSSC group near Shanghai, expected throughout the year 2002, is receiving worldwide attention, as it will rank among the world largest shipyards with a dock size of 470m x 80m, as well as one 900tons

^{83[83]} Marukawa (1999), p. 139-140.

^{84[84]} Nakatsuka (2000), p. 8-9.

and two 600tons heavy duty cranes.^{85[85]} Forecast for the development of the global shipbuilding industry until 2005 expect that China will maintain its position as the world's 3rd largest shipbuilding nation, also due to the fact that the expansion plans by the state-owned shipping fleet China Ocean Shipping Corporation (COSCO) warrants a stable base load for China's shipbuilders.^{86[86]} It is expected that, despite the various structural problems, China's shipbuilding industry will be able to meet the needs of the global shipping industry in terms of facilities, capacities, as well as increasingly also in terms of technical capabilities.^{87[87]}

Machinery and engineering

The machinery and engineering industry is yet another large, state-dominated pillar industry considered to be of strategic importance for China's industrial and technological development, but suffering from similar structural problems. Particularly since the mid 1990s, the slowdown in capital investment has caused a sharp decline in production and triggered drastic, industry-wide restructuring, for instance, by means of mergers.^{88[88]} Generally, China's machinery industry is lagging decades behind the advanced machine building nations like Germany or Japan, and it is questionable whether the high managerial, economic and technical targets for the machinery industry as set in China's vision for 2010 are realistic.^{89[89]} However, due to the diversity of the industry, it is difficult to draw general

^{85[85]} "Kankoku – Chugoku no zosenoryoku no henka to shinzosenjukyu" (Changes in Korean and Chinese shipbuilding capabilities and the demand for new ships). In: Kaijisangyokenkyujoho, No. 397, 20.7.1999, p. 43-60, here: p. 45.

^{86[86]} Kaijisangyokenkyujoho (1999), p. 46-48/59.

^{87[87]} Nakatsuka (2000), p. 9-10.

^{88[88]} Marukawa (1999), p. 108.

^{89[89]} Kikai Shinkokyokai (Japan Society for Promotion of Machine Industry) (1997). Chugoku shinkeizaikeikaku to wagakuni no kikaijohosangyo (China's new economic plan and its impact on our machinery and information industry). Tokyo, p. 39-45

conclusions. China has a well-developed position in basic machine technologies such as agricultural equipment, non-NC (numerically controlled) machine tools, compressors, boilers or diesel engines, and has produced companies like Yuchai Machinery (formerly Yuchai Diesel) that are praised for their modern state-of-the-art management practices, entrepreneurial spirit, manufacturing and product technologies.^{90[90]} Yuchai Machinery is China's largest producer of medium and heavy duty truck engines with an annual output of 50,000 units, sales revenues totaling RMB500 million and over 7,000 people.^{91[91]} Founded in 1951, it was turned from a state-owned company into a listed joint venture stock company in 1992 and awarded with the ISO9001 certificate in 1996.

Also, the advancement of the power generating and civil engineering industry is increasingly being recognized. While China still depends heavily on imports for large-scale power generating plants, it has started to develop export of smaller plants. Companies like Harbin Power Equipment or Dongfang Electric Corporation group are advancing on international markets, although they are still significantly smaller in scale and technologically inferior compared to the world's top power generating firms.^{92[92]} However, the recent news of a large-scale Chinese order for a 300.000kW nuclear plant from Pakistan^{93[93]} and other Chinese orders for international projects in civil and plant engineering underline China's growing international competitiveness.

^{90[90]} Child (2000), p. 45-46;

^{91[91]} For a company profile see <http://ns.mei.cei.gov.cn/enterprise/ycjq.htm>

^{92[92]} Nolan / Wang (2000), p. 27-28.

^{93[93]} Nihon Keizai Shimbun, 18.8.2000, p. 1.

Dongfang Electric Corporation, for example, is one of China's three giant enterprises specialised in power plant equipment and designs, manufacturers, and markets a wide range of power generating equipment such as hydro units for hydro power stations, turbo generators, AC & DC electrical motors and controlling equipment for power plants.^{94[94]} With an annual production capacity of more than 3300MW in thermal generating units and 960MW in hydro generating units the company accounts for one third of China's production. The group comprises 5 wholly owned manufacturer, Dongfang Electric Machinery Works, Dongfang Steam Turbine Works, Dongfang Boiler Works, Dongfeng Electric Machinery Works and Zhongzhou Steam Turbine Works, more than 30 specialised companies, 10 joint - stock companies and more than 100 associated enterprises. The group has established regional companies in over 20 cities in China and branches or liaison offices in Canada, Pakistan, Bangladesh and Iran. Thermal units are exported to Pakistan, Bangladesh, Indonesia and Iran, and hydro units to the United States, U.S., Canada, Turkey, Syria, Philippines and former Yugoslavia. It is also engaging in joint ventures and co-operations with leading foreign manufacturers like Westinghouse, Hitachi and Siemens.

Oil and petrochemical

The situation in China's oil and petro-chemical industry is even more severe than in other heavy, capital-intensive industries, and the solution of its many structural problems is not only a crucial element for China's successful industrial development, but has far-reaching implications for the world energy and material markets.

^{94[94]} For a company profile see <http://www.cei.gov.cn/homepage/sichuan/dqjj.htm>

In recent years, China has emerged rapidly as one of the world's largest oil producers raising its annual output from a mere 0.5 million barrels per day in 1970 to almost 3 million barrels per in the mid 1990s.^{95[95]} However, output growth has levelled off ever since, while oil consumption continues to surge causing increasingly serious shortages in supply. Since China turned into a net importer of oil in 1993, the shortage in supply is expected to rise to 80 million tons by 2010 raising fears about sharp increases in the world's oil prices.^{96[96]} Similar bottlenecks exist in regard to oil refining capacities and conversion facilities due to structural deficiencies.^{97[97]} Until the late 1980s, the Chinese refining industry was largely isolated from international markets and the nature of its refining facilities that were designed to process China's predominantly heavy, waxy, low-sulphur crudes posed constraints to the domestic use of oil energy. With the rapid growth of demand from southern provinces, China faced increasing bottlenecks in the supply of petroleum products and emerged as a net importer since 1992.

One major reason for the structural deficiencies in China's oil refining and petro-chemical industries relates to the form of industrial organization that prevailed until the major reforms that began in 1998.^{98[98]} Until then, the industry was segregated into an oligopoly of 3 major upstream companies (CNPC, CNOOC, CNSPC) for oil exploration, and several downstream companies concentrating on refining and conversion into petroleum products. By means of mergers and business swaps two giant, regional groups of

^{95[95]} Priddle, Robert (1996). China's long-term energy outlook. In: Organisation for Economic Co-operation and Development (OECD). *China in the 21st Century – Long-term Global Implications*. p. 95-125, here: p. 118

^{96[96]} Marukawa (1999), p. 45.

^{97[97]} Priddle (1997), p. 120.

^{98[98]} Marukawa (1999), p. 45 / 51-52.

integrated oil exploring, refining and converting companies were created in 1998, the northern group under the leadership of the China National Petroleum Corporation (CNPC), and the southern group under the leadership of the China Petrochemical (Group) Corporation (SINOPEC). The objectives were, among others, 1) to create comprehensive Chinese majors that are able to compete globally with the world's leading oil companies, 2) to intensify domestic competition among strong, integrated oil companies, and 3) to introduce drastic management reforms by shutting out state influence. While there are basic doubts remaining about the success of management reform, visible progress has been made in recent years. According to a recent Nikkei Weekly report, both CNPC and SINOPEC enjoy a lifting in the global ranking from rank 16th to rank 11th (CNPC), and from rank 20th to rank 17th (SINOPEC) in the annual evaluation of the world oil companies conducted by Petroleum Intelligence Weekly, a major US trade journal.^{99[99]} Both companies are aggressively investing in exploration of new oil fields, also abroad, and into the modernization of their facilities. In April 2000, CNPC listed one of its subsidiaries, PetroChina on the stock exchanges of Hong Kong and New York. Although the initial public offerings did not meet the expectations due to remaining doubts among investors, the listing itself is a major step towards management reform, enhanced transparency and management accountability. Other well-managed energy companies are expected to follow suit in an attempt to tap into international capital markets for funding of their ambitious modernization and capital investment plans.^{100 [100]} For example, 9 leading Chinese petrochemical firms are in the process to establish new capacities for

^{99[99]} "China oil firms prepare for the big time." In: Nikkei Weekly, 29.5.2000, p. 24

^{100[100]} "Kokuyukigyo no kaigai jojo kasouk" (Acceleration of listings by state-owned enterprises on foreign stock exchanges). In: Nihon Keiyai Shimbun, 7.4.2000, p. 7.

ethylene production totalling 1.3 million tons by the year 2005, among them large scale projects by the Shanghai Petrochemical Company (250,000tons), the Yangzi Petrochemical Company (250,000tons), and Yanshan Petrochemical Company (210,000tons).^{101[101]} Similar ambitious expansion plans exist also polypropylene, polyethylene and other key basic petroleum materials. However, these plans are dwarfed by the huge investment projects of the world majors in China. BASF and BP-Amoco are investing into a new ethylene plant, each with a capacity of 600,000tons to be completed in 2004 and 2005 respectively. Shell is investing into several joint ventures with China's CNOOC to built a ethylene plant with a capacity of 800,000tons, a plant for low-density polyethylene with a capacity of 300,000tons, a plant for high-density polyethylene with a capacity of 150,000tons, and a plant for polypropylene with a capacity of 240,000tons,all of them to be completed by the year 2003.

From the above findings, it can be concluded hat China's competitiveness in heavy, capital- and knowledge-intensive manufacturing industries is less advanced and obvious when compared to light, labor-intensive industries. Most sectors suffer from serious structural problems due to the dominance of large, state-dominated firms. Nevertheless, visible progress is being made through industry-wide reorganization, managerial and enterprise reform, as well as technical co-operations and joint venture with leading foreign companies. The built-up of economies-of-scale, the modernization of facilities, and the upgrading of product technologies enjoy top priority

^{101[101]} Kikai Shinkokyokai Keizai Kenkyujo (Economic Research Center of the Japan Society for Promotion of Machine Industry) (2000). Sekiyukagakukokyo no saikochiku to kikaikogyohatten ni kan suru chosakenkyu (Research on the reorganization of the petrochemical industry and the development of the machine industry). Tokyo, 3/2000, p. 90-92/102-112.

within the reform process that –combined with the entrepreneurial spirit of capable managers- has resulted in the emergence of well-managed Chinese firms with a clear international orientation. These firms also capitalize on the high level of past investments into technologies and human capital.

5. 5. Implications for Japan’s industry and possible strategic responses

What are possible implications of these developments in China’s manufacturing industries for Japan’s industry? And what are possible scenarios and counterstrategies by Japanese firms? In the following, an attempt is made to provide some possible, though speculative clues to these issues.

The Sino-Japanese relationship is characterized by a long history of political rivalry and growing economic interdependence, and exerts a crucial influence for political stability and economic prosperity in Asia.^{102 [102]} During the 1990s economic relations between both countries have become even closer and intertwined as a result of the growth in trade, foreign investment, technical co-operation and technology transfer. Trade volume between China and Japan has surged over the past 20 years, but almost tripled between 1990 and 1998.^{103 [103]} Foreign direct investment (FDI) from Japan to China increased by 8 times between 1990 and 1995, though the prolonged economic stagnation of Japan’s economy caused a decline since

^{102 [102]} Fukuda, Kazuo John (1998). Japan and China – The meeting of Asia’s economic giants. New York, The Haworth Press.

^{103 [103]} Hilpert, Hanns-Günther (2000). China and Japan: Conflict or cooperation ? What does trade data say ?. (paper presented at the 9th Annual Conference of the European Association for Japanese Studies in Lathi, 23.8.2000)

1996.^{104[104]} Nevertheless, the level of Japanese FDI flows into China after 1996 is still 4 times higher than in 1990. For Japan, China is the second most important export destiny, the second most important source of imports, and the second most important recipient of FDI. China is Japan's most important site for overseas production by Japanese manufacturers, and the most important recipient of official development aid (ODA). For China, Japan is the most important source of imports, and the second largest export market and source of FDI.

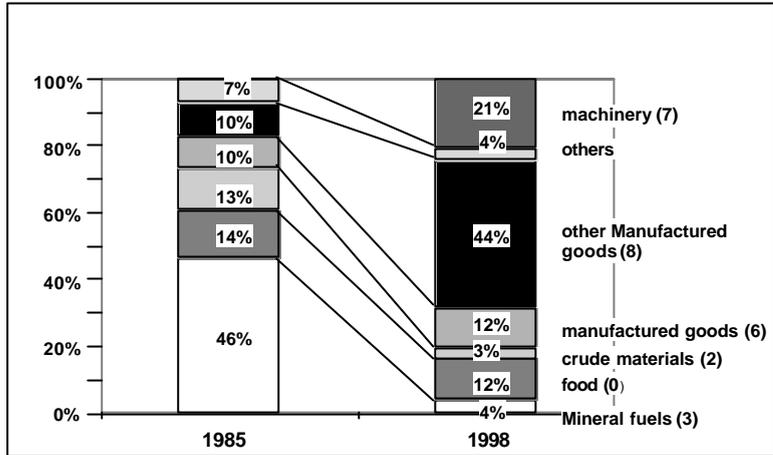
Further analysis of Sino-Japanese trade relations reveals a growing intensity, interdependence and degree of integration of both economies since the early 1990s.

- - From China's point of view, its regional trade structure has gradually shifted towards a growing weight of trade with Japan, reflected in the growing relative importance of the Yangtze delta and the Bohai gulf as a regional export base.^{105[105]}
- - Since the 1990s Japan has emerged as the leading importer of Chinese manufactured goods following the growth in overseas production of Japanese firms in China and the sharp increase of "processing trade". While in the 1985 raw materials and foodstuff accounted for 60% of Chinese exports to Japan, their share has declined to less than 20% in 1998, as manufactured goods increased their share to 80% (see chart 7)

^{104[104]} Tejima, Shigeki (2000). Japan's manufacturing FDI in China: Characteristics and future prospects by industry and region. (paper presented at the 9th Annual Conference of the European Association for Japanese Studies in Lathi, 23.8.2000)

^{105[105]} Chan / Tracy / Wenhui (1999), p. 127-147

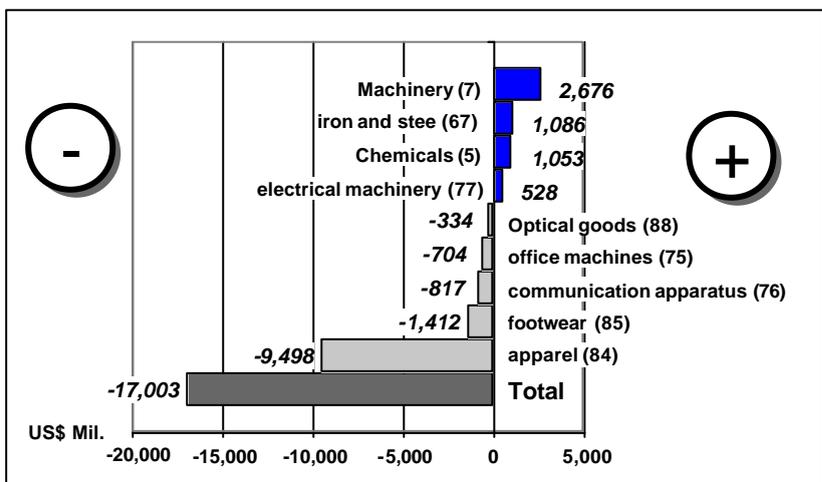
Chart 7: Composition of Chinese Exports to Japan (1985 vs. 1998)



Source : OECD, Foreign Trade by Commodities (in brackets SITC)

- Since 1989, Japan has consistently recorded a trade deficit with China totalling \$17 billion in 1998. Apparel and footwear are the main sources for the trade deficit, but manufactured industrial goods like communication equipment, office machines, or optical goods are contributing a significant and growing portion (see chart 8).

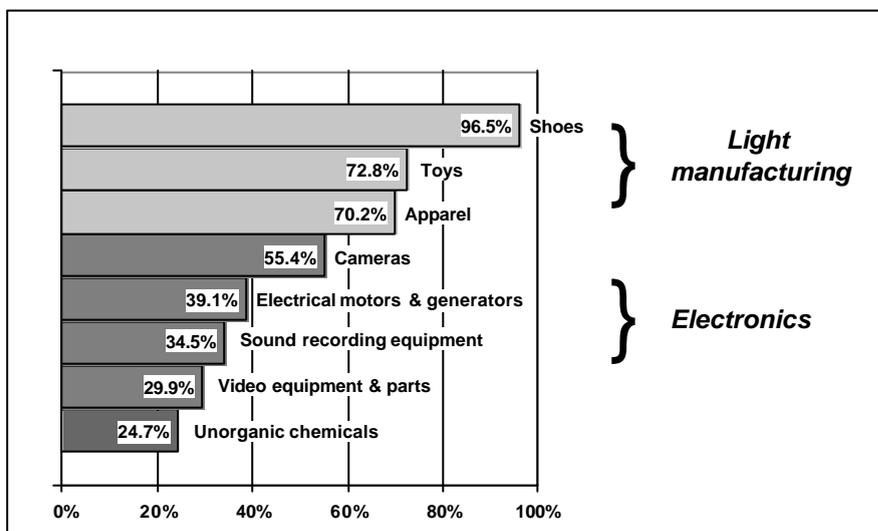
Chart 8: Composition of Japan's Trade Deficit with China (1998)



Source: OECD, Foreign Trade by Commodities (in brackets 2-digit SITC classification)

- Chinese products have gained large and growing share in Japan's import market (see chart 9). China not only dominates in markets like apparel, footwear or toys, where Japan is heavily depending on imports, but has succeeded to gain strong footholds in competitive segments like electronics, where import penetration has been low. China has achieved a far stronger position in Japan's import market than the United States or Europe that have traditionally struggled hard to gain access.^{106[106]}

Chart 9: Chinese Market Shares in Japan's Import Market (1998)



Quelle: JETRO, White Paper on International Trade, 2000

From these findings it can be concluded that complementary rather than the intra-industrial trade still remains the basic feature of Sino-Japanese trade relations, but that there is a marked shift towards manufactured goods. Chinese products are competitive not only in traditional light manufacturing industries like textiles or toys, but increasingly in labor-intensive assembly-based industries like electronics, communication equipment or optical goods.

For Japan, these industries are still important in terms of scale, employment and global market position, where it maintains a formidable manufacturing

^{106[106]} Chan / Tracy / Wenhui (1999), p. 142-144

and supplier base. Despite Japan's strong position in and focus on technology-intensive, high-value added product segments, the revenue and profits generated from high volume, cost-competitive market segments still exert a significant influence on the overall economic performance of many companies in industries such as home appliances, consumer electronics, communication equipment, office equipment, trucks, agricultural machinery, or motorcycles.¹⁰⁷^[107] Although Japanese firms in these industries have aggressively shifted production facilities to lower cost production sites in overseas, mainly to South East Asia and recently to China, they are increasingly vulnerable to China's growing competitiveness. Next to China's labor cost advantages, enhancement of product quality, improvements in manufacturing management, and growth in productivity are important factors that cause a relative decline of Japan's competitiveness vis-à-vis China that may well lead to a head-on rivalry with Japanese firms, not only on global markets, but increasingly also on Japan's home turf.

Japanese firms in these industries do not have many strategic options to respond to this threat. Being hesitant to retreat from these business fields, they accelerate their move to overseas production, adding more and more products and components with higher value added. Production on mainland China is assuming a growing importance in the context of this strategy. For example, leading companies like Sony, Sharp, Sanyo or Funai Electric in audio-visual equipment, like NEC or Fujitsu in computers and

¹⁰⁷^[107] A good example is the home appliance industry. Home appliance products still account for a significant share of business with most of Japan's comprehensive electronic manufacturers like Hitachi, Toshiba, Matsushita Electric, Sharp or Sanyo, and are responsible for their eroding profit position. Instead of retreating from these business segments like General Electric has done, Japanese firms are trying to maintain their positions in an effort to secure employment. See: "Ayaushi Nippon no kaden, doronuma no shueki." (Japan's home appliance industry is in danger and its profitability in a morass). In: Nikkei Business, 13.11.2000, p. 12.

communication equipment, like Canon, Ricoh or Seiko Epson in office equipment, like TDK, Murata Electric, Taiyo Yuden in electronic parts, or like Toray and Teijin in textiles are embarking on large-scale production of key components and products in China.^{108[108]} In these increasingly global industries China is becoming the strategic market and manufacturing site as other foreign companies are taking similar strategic moves, and as Chinese firms are building up scale. Global competitive success for Japanese firms seems to depend more and more on the successful management and integration of the Chinese operations into their global organization.^{109[109]}

The ongoing overseas shift of production facilities and procurement by Japanese manufacturing firms has severe consequences for Japan's large supplier industries. While the process of "industrial hollowing-out" started in the mid 1980s as a result of the rapid appreciation of the Japanese Yen, it is likely to further accelerate in the nearer future as many labor-intensive, assembly-based industries are losing their global competitiveness. These trends are increasingly visible in manufacturing industries like casting (e.g. for machine bodies), dies and mold making (e.g. for metal and plastic parts), or in processing and subcontracting industries like parts machining or (sub) assembly (e.g. printed circuit boards).^{110[110]} The strategic challenge for Japanese suppliers and subcontractors is to increase competitiveness by

^{108[108]} "Oote seni meka – seisansetsubi wo chugoku de zosan" (Main textile manufacturers expand their production facilities in China). In: Nihon Keizai Shimbun, 6.8.2000, p. 11; Nikkei Business, 27.9.1999, p. 36-49; Nikkei Business, 27.3.2000, p. 8-9; Nikkei Business, 17.7.2000, p. 26-40.

^{109[109]} For a detailed analysis of Japanese management of Chinese operations see: Legewie, Jochen (2000). Control and coordination of Japanese subsidiaries in China – Problems of an expatriate-based management system. DIJ-Working Paper 00/03, Deutsches Institut für Japanstudien, Tokyo.

^{110[110]} For an example refer to the analysis of the dies and mold making industry. See: Kanemura, Tomoyasu (2000). "Kanagata sangyo no kokusaibungyo no doko – Tayoka suru kanagata seisan." (Developments in the international division of labor in the dies and mold industry - Diversification of dies and mold making). In: Kikai Shinko, 11/2000, p. 32-36.

moving abroad by themselves or by engaging in international alliances or networks, or to retreat from their traditional business by developing independent, proprietary know-how, technologies and own products.

A different scenario seems likely for the scale- and (human) capital-intensive, heavy manufacturing industries like steel, shipbuilding, paper, cement, oil refining / petrochemicals, machinery and civil engineering, or automotive, because of the peculiar strategic positioning of these industries in both countries.

From Japan's perspectives, these "sunset" industries were the backbone for its rapid economic and technological development, but domestic demand in these industries is maturing or even declining. Most of these industries suffer from excess capacity and low capacity utilization as well as from overspreading their business portfolio into unprofitable segments. Despite their technological leadership position in many of these industries (e.g. steel, shipbuilding), cost competitiveness is declining and international competition, particularly from South Korea and from multi-national firms, is on the increase. In addition, industries like oil refining or petrochemicals are suffering from diseconomies of scale due to uncompetitive capacities and low utilization. Other industries like automotives, cement or paper are faced with a global wave of concentration. Most companies that operate in these industries are engaged in massive restructuring efforts such as streamlining their business portfolios, reengineering of their processes and cutting capacities.¹¹¹ [111] Corporate restructuring efforts in these industries

¹¹¹[111] For a deeper, industry-specific analysis refer to: Matsui, Kathy / Suzuki, Hiromi (1999). Anatomy of restructuring – This time for real?. In: Goldman Sachs Japan Portfolio Strategy, Tokyo, March 31, 1999;

increasingly involve industry-wide, structural change across company boundaries as business alliances, tie-up with foreign firms as well as mergers and acquisition become more and more common.^{112[112]}

At the same time, the Chinese market is one of the few remaining markets where future growth can be expected. In order to sustain the global market position, it is essential for Japanese firms in these industries to gain a strong foothold on the Chinese domestic market. Otherwise, the very existence and industrial base seems endangered.

From the Chinese point of view, the heavy manufacturing industries are of an even higher strategic importance. The success of China's enterprise reform, sustained economic development and social stability depend to a large extent on the ability to enhance the competitiveness and efficiency of these mainly state-dominated, large-scale industries. It is, therefore, no surprise that the Chinese government, in its 9th 5-Year Plan for the year 1996-2000 and in its 15-Year Perspective Plan, has declared petrochemicals, construction/steel, automotive and machinery as pillar industries that are at the center of Chinese reform efforts and industrial policy. The presence in these industries of substantial economies of scale as well as their scope for significant vertical integration advantages has led the authorities to

Matsui, Kathy / Suzuki, Hiromi / Ushio, Yoko (2000). Restructuring redefined – From cost cutting to reengineering. In: Goldman Sachs Japan Portfolio Strategy, Tokyo, November 6, 2000; Ostrom, Douglas (2000). Corporate Japan's restructuring efforts: A progress report. In: JEI Report No. 20A, Japan Economic Institute, Tokyo, May 19, 2000.

^{112[112]} Raupach-Sumiya, Jörg (2000). Auswirkungen wachsender M&A Aktivitäten auf das japanische Unternehmenssystem. In: Lichtblau, Karl / Pascha, Werner / Storz, Cornelia (Hrsg.): Workshop Klein- und Mittelunternehmen in Japan V – Themenschwerpunkt: M&A in Japan – Ein neues Instrument der Unternehmenspolitik. Duisburger Arbeitspapiere Ostasienwissenschaften No. 29/2000, Duisburg, März 2000, p. 23-40.

encourage the building-up of large enterprises within them.^{113[113]} Without doubts, these industries and enterprise will continue to receive massive governmental protection and support despite all efforts within the WTO talks to enhance free, market-based competition in China. At the same time, much of the success of the reforms and modernization efforts depends on continued technology transfer, cooperation and investment from foreign partners. Therefore, it seems likely that China will continue to try to link market access and foreign direct investment to the transfer of technology, management and skills.

When taking the strategic situation of both, Japan and China, into consideration, a growing economic interdependence between both economies seems to be emerging as the interests of both nations and their industries are tied to each other. The ability to sustain Japan's competitiveness and global market position in these industries largely depends on access to the Chinese market. Vice versa, the ability of China to upgrade its technological and managerial base and to secure the success of its economic and enterprise reforms depends on the willingness of foreign companies to continue to invest into China and to transfer technologies, capabilities and know how. Due to its regional vicinity as well as its leading technological position in key, heavy manufacturing industries, Japan appears to be the logical strategic partner. Therefore, the emergence of Sino-Japanese industrial alliances may well be a realistic scenario for important scale- and (human) capital-intensive, heavy manufacturing industries like steel, shipbuilding, petrochemicals, civil engineering or automotive.

^{113[113]} Child (2000), p. 33-35. For a detailed analysis of China's industrial policy refer to: Marukawa, Tomoo (ed.) (2000). *Ikoki chugoku no sangyo seisaku* (China's industrial policy in transition). The Institute of Developing Economies, Tokyo.

While the benefits for China are more or less obvious, alliances with Chinese firms could also be attractive for Japanese firms. Next to better access to and insight into the Chinese market, the active pursuance of alliances enables them to better control the flow of know how and technology, in particular if the WTO membership assures the transparency and enforcement of contract law. Alliances with Chinese firms better enable Japanese firms to contain a growing competitive threat by China's firms by means of engagement. Furthermore, such alliances may exploit potentials for intra-industrial specialization with both partners concentrating on specific segments, products, or processes. Such alliances can become an integral part of Asian-wide alliances or network involving Japanese, Korean, Taiwanese and Chinese firms. The recent alliance between Nippon Steel and Posco of South Korea may well serve as a model case.^{114[114]} This comprehensive tie-up between the world's largest and second largest steel manufacturer, among others, aims for the establishment of joint ventures in China. Although not explicitly stated, China's largest steel firm, the Shanghai Baogang group, with whom both companies have longstanding cooperative ties, may well play an important role within this strategy. Such an arrangement serves two strategic purposes: access to the Chinese market, as well as containment of a growing Chinese rival.

This argument is, agreeably, quite speculative as it is still in want for firm empirical evidence. For the purpose of its verification –or dismissal- it seems worthwhile to closely watch developments in other heavy

^{114[114]} “Aija de s hudoken nerau” (Aiming for leadership in Asia). In: Nihon Keizai Shimbun, 3.8.2000, p. 11.

manufacturing industries like oil refining, petrochemicals, cement, paper or shipbuilding, and strategic moves of large Japanese manufacturing like Mitsubishi Heavy Industries, Kawasaki Heavy Industries, Mitsubishi Chemical, Toshiba or Hitachi.

6. 6. Summary

This paper attempted to provide a comprehensive analysis of China's growing international competitiveness in manufacturing and speculated on possible implications for and strategic responses by Japan's industry. The main arguments can be summarized as follows:

Despite the progress of economic reforms, China's advancement to the world's 10th largest trading nation and growing competitive success in manufactured goods, China remains a developing country with huge structural problems.

Nevertheless, the reform process in China has liberated potentials and competitive forces that have led to the emergence of large domestic growth industries and competitive, well managed firms, both in labor-intensive, assembly-based industries as well as in scale- and (human) capital-intensive, heavy manufacturing industries.

Increasing competition on China's domestic markets and continued foreign technology transfer encourage the advancement of resources and factors, thereby enhancing Chinese competitive advantages in manufacturing.

Japan's assembly industries are likely to face increasing competition by Chinese firms, which accelerate the internationalisation of procurement and the shift to overseas production in China. This will further accelerate the process of "industrial hollowing-out" of Japan's supplier and subcontracting industries.

Strategic alliances between Japanese and Chinese firms are a likely scenario in scale- and capital-intensive industries due to growing economic interdependence between China and Japan.

References:

Books and articles

- Chan, Thomas / Tracy, Noel / Wenhui, Zhu (1999). *China's Export Miracle – Origins, Results and Prospects*. Basingstoke / London, MacMillan Press, p. 35-50
- Child, John (2000). *Management and Organization in China: Key Trends and Issues*. In: Li, J.T. / Tsui, Anne S. / Weldon, Elizabeth (eds.). *Management and Organization in the Chinese Context*. Basingstoke / London, MacMillan Press, p. 33-62
- Fujitsu Research Institute (2000). Internal material obtained by the author
- Fukuda, Kazuo John (1998). *Japan and China – The meeting of Asia's economic giants*. New York, The Haworth Press
- Gang, Ye (2000). *Chugokutekkogyohatten no kozohendo (The growth of iron and steel industry in China)*. Yotsuya Round Publishers, Tokyo
- Hilpert, Hanns-Günther (2000). *China and Japan: Conflict or cooperation ? What does trade data say ?*. (paper presented at the 9th Annual Conference of the European Association for Japanese Studies in Lathi, 23.8.2000)
- Huchet, Jean François (1997). *The China Circle and Technological Development in the Chinese Electronics Industry*. In: Naughton, Barry (ed). *The China Circle – Economics and Electronics in the PRC, Taiwan, and Hong Kong*. Washington D.C., Brookings Institution Press, p. 254-285
- Jian, Min Jin (2000). *Chugoku no kigyokaiku to kopreto gabanansu (Corporate restructuring and corporate governance in China)*. In: FRI Review Vol. 4, No. 2, April 2000, p. 47-65
- Jin, Jian Min (2000). *Chugoku no netto sangyo (China's Internet industry)*. In: FRI News Letter, No. 55, March 10, 2000
- Kanemura, Tomoyasu (2000). “*Kanagata sangyo no kokusaibungyo no doko – Tayoka suru kanagata seisan.*” (Developments in the international division of labor in the dies and mold industry - Diversification of dies and mold making). In: *Kikai Shinko*, 11/2000, p. 32-36.
- Kikai Shinkokyokai Keizai Kenkyujo (Economic Research Center of the Japan Society for Promotion of Machine Industry) (2000).

- Sekiyukagakukokyo no saikochiku to kikaikogyohatten ni kan suru chosakenkyu (Research on the reorganization of the petrochemical industry and the development of the machine industry). Tokyo, 3/2000
- Kikai Shinkokyokai Keizai Kenkyujo (Economic Research Center of the (Japan Society for Promotion of Machine Industry) (1997). Chugoku shinkeizaikeikaku to wagakuni no kikaijohosangyo (China's new economic plan and its impact on our machinery and information industry). Tokyo
- Kueh, Y.Y. (1999). Economic Reform in Chinese Industry: Efficiency and Instability. In: Kueh, Y.Y. / Chai, Joseph C.H. / Fan, Gang (eds.). Industrial Reform and Macroeconomic Instability in China. Oxford, Claredon Press, p. 3-19
- Legewie, Jochen (2000). Control and coordination of Japanese subsidiaries in China – Problems of an expatriate-based management system. DIJ-Working Paper 00/03, Deutsches Institut für Japanstudien, Tokyo
- Li, Feng / Li, Jing (1999). Foreign Investment in China. Basingstoke / London, MacMillan Press
- Liu, Minquan (2000). Capitalist Firms, Public Enterprises: Ownership Reform and Privatisation of Chinese State-owned Enterprises. In: Cook, Sarah / Yao, Shujie / Zhuang, Juzhong (eds.). The Chinese Economy under Transition. Basingstoke / London, MacMillan Press, p. 35-63
- Lloyd's Register (2000). World Shipbuilding Statistics
- Marukawa, Tomoo (1999). Chugokusangyo kenkyunyumon / Kaisetsu to deta (Introduction to research on Chinese industry - Interpretation and facts). Ajia Keizai Kenkyujo (The Institute of Developing Economies), Tokyo
- Marukawa, Tomoo (ed.) (2000). Ikoki chugoku no sangyo seisaku (China's industrial policy in transition). Ajia Keizai Kenkyujo (The Institute of Developing Economies), Tokyo
- Matsui, Kathy / Suzuki, Hiromi (1999). Anatomy of restructuring – This time for real?. In: Goldman Sachs Japan Portfolio Strategy, Tokyo, March 31, 1999
- Matsui, Kathy / Suzuki, Hiromi / Ushio, Yoko (2000). Restructuring redefined – From cost cutting to reengineering. In: Goldman Sachs Japan Portfolio Strategy, Tokyo, November 6, 2000
- Mitsubishi Research Institute (2000). WTO kameigo no chugoku bijiness – sono kikai to kyoi wa do kawaruka (The China business after WTO

- accession – How opportunities and threats change?). Press release of 15.2.2000, Tokyo
- Nakatsuka, Seiji (2000). Henbo suru sekai no zosensangyo no suii to tenbo (Trends and prospects for the changing global shipbuilding industry). Kaijisangyokenkyujo, Tokyo, 5.4.2000.
- Naughton, Barry (1997). The Emergence of the China Circle. In: Naughton, Barry (ed). The China Circle – Economics and Electronics in the PRC, Taiwan, and Hong Kong. Washington D.C., Brookings Institution Press, p. 3-37.
- Nolan, Peter / Xiaoqiang, Wang (2000). Reorganizing Amid Turbulance: China's Large-scale Industry. In: Cook, Sarah / Yao, Shujie / Zhuang, Juzhong (eds.). The Chinese Economy under Transition. Basingstoke / London, MacMillan Press, p. 9-34
- Nyaw, Mee-Kau (1999). Readjustment of the Managerial and Organizational Structure of Chinese Enterprises. In: Kueh, Y.Y. / Chai, Joseph C.H. / Fan, Gang (eds.). Industrial Reform and Macroeconomic Instability in China. Oxford, Claredon Press, p. 31-45
- Ohhara, Moriki (2000). Chugokukigyo no kaigaishinshutsu / Kaden, otobai meka no jirei kara (Foreign expansion by Chinese firms – Examples from the home electronics and motorcycle manufacturers). In: Ajiken World Report, No. 56, 5/2000, p. 28-34
- Ostrom, Douglas (2000). Corporate Japan's restructuring efforts: A progress report. In: JEI Report No. 20A, Japan Economic Institute, Tokyo, May 19, 2000
- Porter, Michael E. (1990). The Competitive Advantage of Nations. London / Basingstoke, MacMillan Press
- Priddle, Robert (1996). China's long-term energy outlook. In: Organisation for Economic Co-operation and Development (OECD). China in the 21st Century – Long-term Global Implications. p. 95-125
- Raupach-Sumiya, Jörg (2000). Auswirkungen wachsender M&A Aktivitäten auf das japanische Unternehmenssystem. In: Lichtblau, Karl / Pascha, Werner / Storz, Cornelia (Hrsg.): Workshop Klein- und Mittelunternehmen in Japan V – Themenschwerpunkt: M&A in Japan – Ein neues Instrument der Unternehmenspolitik. Duisburger Arbeitspapiere Ostasienwissenschaften No. 29/2000, Duisburg, März 2000, p. 23-40
- Shen, Xiaobai (1999). The Chinese Road to High Technology – A Study of Telecommunications Switching Technology in the Economic Transition. Basingstoke / London, MacMillan Press

- Shi, Yizheng (1998). *Chinese Firms and Technology in the Reform Era*. London, Routledge
- Tejima, Shigeki (2000). *Japan's manufacturing FDI in China: Characteristics and future prospects by industry and region*. (paper presented at the 9th Annual Conference of the European Association for Japanese Studies in Lathi, 23.8.2000)
- The World Bank (1997). *China Engaged – Integration with the Global Economy*. China 2020 Series, Washington D.C.
- United States International Trade Commission (1999). *Assessment of the Economic Effects on the United States of China's Accession to the WTO*. Publication 3228, Washington D.C.
- Yoshitomi, Masaru (1996). *The Comparative Advantage of China's Manufacturing in the Twenty-first Century*. In: Organisation for Economic Co-operation and Development (OECD). *China in the 21st Century – Long-term Global Implications*. P. 53.-69.
- Zhang, Jun (2000). *Market Size, Scale Economics and Loss-Making in China's Post-Reform State Manufacturing Industry*. In: *East Asian Review*, March 2000, p. 3-27
- Zhang, Xiao-guang (2000). *China's Trade Pattern and International Competitive Advantage*. Basingstoke / London, MacMillan Press

Articles from newspapers and magazines

- “Ajia de shudoken nerau” (Aiming for leadership in Asia). In: *Nihon Keizai Shimbun*, 3.8.2000, p. 11
- “Ayaushi IT rikkoku – saigo no toride, sentanbuhin ga Nihon kara nigete iku” (Watch out! IT state – The last fortress, high technology parts, leave Japan). In: *Nikkei Business*, 17.7.2000, p. 26-40
- “Ayaushi Nippon no kaden, doronuma no shueki.” (Japan's home appliance industry is in danger and its profitability in a morass). In: *Nikkei Business*, 13.11.2000, p. 12
- “China becoming IT powerhouse”. In: *Nikkei Weekly* 31.7.2000, p. 21
- “China exporters shift focus to electronics”, In: *Nikkei Weekly*, 28.2.2000, p. 21
- “China firm turns heads with winning strategy”. In: *Nikkei Weekly*, 31.1.2000, p. 19
- “China oil firms prepare for the big time.” In: *Nikkei Weekly*, 29.5.2000, p. 24

- “Chugokutsushinsangyo – Keitaikenhiki kyukakudai” (China’s telecommunication industry – Rapid expansion led by mobile phones“). In: Nihon Keizai Shimbun, 22.6.2000, p. 8
- “Chugoku no ootekokuyu kigyo – Kaigai de oogata shikin chotatsu” (China’s large state-owned enterprises procure large-scale funds on overseas capital markets”. In: Nihon Keizai Shimbun, 28.9.2000, p. 7
- “Daito suru chugoku shiei kigyo – Hinshitsu kosuto kanritettei“ (Emerging private Chinese firms – Enforcing quality and cost control management). In: Nihon Keizai Shimbun, 4.7.2000, p. 10
- “Daito suru sangyotaikoku - WTO kamei, shijo ni chiho” (The emerging industrial giant – The market is gaining ground with WTO membership). In: Nihon Keizai Shimbun, 18.8.2000, p. 1
- “Daremo shiranai – Chugoku bijinesu no kachigumi” (Nobody knows the winners in China business). In: Nikkei Business, 27.9.1999, p. 36-49
- „Ground Zero for China’s IT explosion“. In: Nikkei Weekly, 26.6.2000, p. 24
- “Kaden uriage rankingu” (Ranking of home appliance turnover). In: Chugokujoho, Mitsubishi Research Institute, Vol. 16 No. 1, April 2000, p. 50
- “Kankoku – Chugoku no zosenoryoku no henka to shinzosenjuku” (Changes in Korean and Chinese shipbuilding capabilities and the demand for new ships). In: Kaijisangyokenkyujoho, No. 397, 20.7.1999, p. 43-60
- “Kara terebi de karuteru“ (Cartel in color TC industry). In: Nihon Keizai Shimbun, 13.6.2000, p. 7
- “Keieisha ga risuku sei koritsuka tsuikyū” (Management takes risk and pursues efficiency). In: Nikkei Business, 23.10.2000, p. 14
- “Kojo wa shorumu mieru kanri ga chugoku de soko” (The management principle of the factory being the showroom is succeeding in China). In: Nikkei Business, 20.9.1999, p. 49-50
- “Kokunai shijo seishi – senshinkoku ni shojun” (Dominating the domestic market – Targeting industrialized countries). In: Nihon Keizai Shimbun, 31.7.2000, p. 7
- “Kokuyukigyo no kaigai jojo kasouk“ (Acceleration of listings by state-owned enterprises on foreign stock exchanges). In: Nihon Keiyai Shimbun, 7.4.2000, p. 7
- “Mo tomaranai, haitekku buhin seisan no chugoku shifuto – Jidokasetsubiison ga manaita kudoka” (The shift of high tech parts production to China cannot be stopped – The dependence on

automated production technologies invites the industrial hollowing-out). In: Nikkei Business, 27.3.2000, p. 8-9
“Oote seni meka – seisansetsubi wo chugoku de zosan” (Main textile manufacturers expand their production facilities in China). In: Nihon Keizai Shimbun, 6.8.2000, p. 11
„Schiffsbau in der VR China spürt Wirkung der asiatischen Finanzkrise.“ In: bfai – Länder und Märkte. Bundesstelle für Außenhandelsinformationen (bfai), 25.1.1999

Company profiles

Chunlan: <http://www.chunlan.com>

Dongfang Electric Corporation:

<http://www.cei.gov.cn/homepage/sichuan/dqjj.htm>

Haier group: <http://china.haier.com>

Hainan Sundiro Motorcycle Corporation: <http://www.sundiro.com>

Konka: <http://www.konka.com>

Legend: <http://www.legend-holdings.com>

Midea: <http://www.chinamd.com>

Quingqi Group: <http://china-qingqi.com>

Shanghai Baogang group: <http://www.baosteel.com>

TCL: <http://www.tcl-elec.com>

Yuchai Machinery: <http://ns.mei.cei.gov.cn/enterprise/ycjq>