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Introduction

“The China price”(…) the three scariest words in US industry. Cut your price at least 30% or lose your customers. Nearly every manufacturer is vulnerable -- from furniture to networking gear. The result: a massive shift in economic power is underway.
Business Week¹

- 1 Given China’s demonstrated ability to conquer one export market after another, an important question for both would-be competitors and world policy-makers weighing up various protectionist measures is this: How has China been able to emerge as the world’s “factory floor”? The answer lies in the eight major “economic drivers” of the China price: low wages, counterfeiting and piracy, minimal worker health and safety regulations, lax environmental regulations and enforcement, export industry subsidies, a highly efficient “industrial network clustering”, the catalytic role of foreign direct investment (FDI), An undervalued currency.
- 2 These drivers have been identified from research conducted as part of the “China price Project” at the Merage School of Business, UC-Irvine (described in the Appendix). This article seeks to derive estimates of the relative contributions of each of these eight drivers to China’s competitive advantage. The United States manufacturing sector is used as the benchmark for comparison. The analysis yields several important insights for both policy-makers and management strategists.
- 3 First, the determination of the China price extends well beyond issues of cheap labour, currency misalignments, and a lax environmental regime—the “usual suspects” in many trade debates. Second, there are important synergies between many of the China price drivers. For example, both an undervalued currency and export industry subsidies help attract additional FDI, which in turn, facilitates industrial network clustering. Finally, aspects of many of the China price drivers appear to fall outside the norms of international trade agreements (e.g. the World Trade Organisation (WTO))

and/or international standards for environmental protection and worker health and safety.

- 4 These findings have important implications for companies and their management strategists seeking ways to compete with China and facing decisions about outsourcing and offshoring production activities to China. The findings have equally important implications for world policy-makers (and therefore corporate, environmental and labour lobbyists) seeking ways to counter the many sharp competitive edges of the China price and its threat to domestic employment, income, the global environment and labour market.

Data and methodology

- 5 The cost structure of the typical US manufacturing firm is used as the benchmark of comparison. At the outset, two important limitations of the analysis are noted.
- 6 First, cost structures across individual manufacturing sectors are likely to vary substantially. For example, textile manufacturing is highly capital intensive while the apparel made from finished textiles is highly labour intensive.
- 7 A second issue of comparability arises because US and Chinese manufacturing entities tend to be concentrated in different industries. For example, while the United States has a large aircraft industry, China does not. This limitation notwithstanding, it may still be useful to look at how the four major components of a typical production function—land, labour, capital and energy—are deployed in the two respective countries as a means of identifying the sources and size of any competitive advantages.
- 8 This US cost structure has been developed from multiple sources, including, but not limited to, data from the Annual Survey of Manufacturers of the US Census Bureau, the Industry Economic Accounts of the US Bureau of Economic Analysis, the Compustat database, Blackfriar’s Communications for marketing data, Gartner for software expenditures, and Technology Review for data on research and development expenditures.² This cost structure is summarised in Table 1, which reports relative costs by the percentage of a dollar of manufacturing output. For example, raw materials represent 46 cents on the US manufacturing dollar, labour costs represent 21 cents, advertising and marketing 9 cents, and so on.

1. The U.S. Manufacturing Cost Structure Dollar

Raw Materials	45.98%
Labor	21.00%
Advertising & Marketing	9.00%
R&D	8.50%
Interest Expenses	3.44%
Transportation	2.90%
Health & Safety	1.60%
Energy	1.53%
Environmental	1.48%
Land & Rent	1.46%
Utilities	1.16%
Software	0.80%

- 9 The analysis that follows illustrates how each of the eight economic drivers of the China price reduce one or more of the components of the total cost for Chinese manufacturers. For the six of the eight drivers in the list above, the cost impacts may be directly measured, e.g., lower labour costs in China directly reduce the labour cost component, lower regulatory compliance costs reduce environmental and health and safety costs. However, for two economic drivers in the list, FDI and the impacts of an undervalued currency, the cost impacts are of a more indirect or aggregate nature and require a different approach to valuation.

Driver #1: Low wages for high quality work

What is stunning about China is that for the first time we have a huge, poor country that can compete both with very low wages and in high tech. Combine the two, and America has a problem.

Professor Richard Freeman, Harvard University³

- 10 The available data on wages and compensation in China is scant and of poor quality. Many enterprises regularly underreport data to avoid taxation and payments to social insurance and often keep two sets of books for "management accounts" and "tax accounts."⁴ Acknowledging such large variances, this analysis relies on the best available data compiled by Judith Banister (2005),⁵ who has calculated an average hourly compensation rate of \$0.57.
- 11 This rate is not the lowest in the world. However, the productivity of Chinese workers is considerably higher than many other lower wage nations. Accordingly, to properly estimate the cost advantage of China's low hourly compensation, it must be adjusted for productivity.⁶
- 12 Using supplementary data provided by the US Conference Board, Table 2 compares hourly compensation in the US and China on a productivity-adjusted basis. It illustrates that China's hourly compensation costs are about one-fifth of those in the United States

(18%).⁷ This suggests that Chinese manufacturers save 17 cents on the manufacturing dollar for labour costs relative to their US competitors.

2. Productivity-adjusted Compensation Rates in China

	Average Hourly Compensation	Productivity Index (US = 100)	Productivity- Adjusted Labor Cost	Adjusted Cost as Percent of U.S.
U.S.	\$23.17	100	\$23.17	100%
China	\$0.57	13.7	\$4.16	18%

- 13 In most cases, the wage advantage of a developing country disappears, or at least narrows considerably, over time as it experiences rapid economic growth and labour markets tighten. How long this advantage is likely to persist is an open question.
- 14 Short-term downward pressure on wages is being exerted by a large "reserve army" of unemployed workers estimated to be anywhere from 100 million to 200 million. Many of these workers have been laid off or furloughed (*xiagang*) as a consequence of the privatisation of inefficient state-owned enterprises (SOEs). They have become part of a larger "floating population" of migrants. With labour unions banned in China, there likewise has been no emergence of any bargaining power for worker units.
- 15 Longer term, the heavier counterweight to rising wages is China's official policy of rapid urbanisation to combat chronic rural poverty. The Chinese government is seeking to move as many as five hundred million peasants off the farm and into China's factories over the next several decades. To put these numbers into perspective, the combined current workforces of the United States and Europe number less than 400 million. Thus, despite unprecedented rates of economic growth, wage pressures in China are unlikely to significantly rise soon, making low wages a significant and perennial component of the China price for decades to come.
- 16 As to the timeframe in which productivity-adjusted wages may rise, recent data suggests that nominal wages may be rising quite quickly (10%-15% a year since 1999). Because productivity has been rising at a faster rate, unit labour costs remain in decline.
- 17 Note, however, this decline in unit labour costs is largely a function of the high rate of entry into the labourforce. This rate of entry will be at its peak from now until about 2011 and then should start to decline.
- 18 Once new entrants into the labourforce start to decline significantly, it is quite possible that unit labour costs will start to rise since businesses will have to pay more to retain workers for longer. Thus productivity-adjusted Chinese wages could start to rise as early as in the next decade.

Driver #2: Piracy & counterfeiting

China is the epicenter of the counterfeits boom....
 Just a few years ago, counterfeiting was all Gucci bags and fake perfume. Now it's everything. It has just exploded. It is many times larger a problem than it was only a few years ago. The counterfeit inventory ranges from cigarette lighters to automobiles to pharmaceutical fakes that can endanger a life. I would bet that there are companies in this country [the US] that don't even know they're getting screwed around the world.

Frank Vargo, National Association of Manufacturers⁸

- 19 “Piracy” refers to the unauthorised production, distribution or use of a good or service. The goal of a pirate is to create a look-alike “knockoff” that can be sold to a customer as such. “Counterfeiting” involves trying to pass off the pirated products as that of the real, branding corporation. Thus, a golf club that looks like a Callaway driver but has a name like “Hallaway” is a pirated knockoff, whereas as knockoff sold as a “Callaway” club is a counterfeit.
- 20 The World Customs Organisation estimates that counterfeiting accounts for 5% to 7% of global merchandise trade and represents the equivalent in lost sales annually of around US\$500 billion.⁹ Such counterfeiting costs the pharmaceutical industry alone close to US\$50 billion a year, the auto industry more than US\$10 billion annually, and the software and entertainment industries billions more.¹⁰
- 21 China is not the only country engaged in this half a trillion dollar trade. Other hotbeds include Russia, India, Vietnam and South Africa. However, China is considered to be the largest pirate nation; it accounts for an estimated two-thirds of all the world's pirated and counterfeited goods and 80% of all counterfeit goods seized at US borders.
- 22 Despite tough rhetoric from the Chinese government, many critics have argued that much of the country's counterfeiting and piracy is state-sanctioned. As noted by numerous scholars, such institutionalised violations of international intellectual property rights laws and treaties create millions of jobs, help to control inflation, and boost the standard of living of hundreds of millions of Chinese consumers. The question for this analysis is what impact might Chinese piracy and counterfeiting have on the China price. To answer this question, three of the most important elements of the counterfeiting and piracy cost equation—software piracy, reduced marketing and advertising expenses, and lower capital expenditures on research and development—are examined.
- 23 The rate of software piracy in China is well over 90%. This provides substantial savings in both the operating and capital budget portions of the balance sheet for most Chinese enterprises. Based on data published by Gartner, US companies spend, on average, 0.3% of their overall budget on software.¹¹ Assuming a piracy rate of 90%, this suggests that a China price savings of a little less than one-third of a cent relative to the US manufacturing dollar.
- 24 In addition, Chinese counterfeiters need not incur either significant research and development expenditures or substantial advertising and marketing costs to promote

their "brand". As noted by A.T. Kearney, "counterfeiting allows skipping the investment necessary to create, develop and market products and go directly to profits. No R&D headaches. No brand building. No advertising."¹² (As a counterpoint argument here, it is useful to note that it has also frequently argued that this failure to develop branding and intellectual property depresses the value of Chinese-made products and limits the markets in which they can be sold.)

- 25 A study conducted by Blackfriar's Communications of companies of all sizes and across many industries suggests that an average of roughly 9% of revenues are devoted to marketing expenses.¹³ To translate this into an effect on the China price, it is first necessary to assume that some fraction of the Chinese GDP is attributable to counterfeiting and piracy activity. Oded Shenkar (2005) reports estimates that range between 10% and 30%.¹⁴ This suggests that 0.9% to 2.7% of the China price advantage or a mid-range of 1.8 cents on the manufacturing dollar may be attributed, on average, to the lack of marketing expenses for pirated goods.
- 26 A similar calculation may be made for industrial research and development (R&D). Industries such as autos, biotechnology, semiconductors and pharmaceuticals are particularly R&D-intensive, with R&D expenditure as a percentage of revenue in the range of 15% or more. More broadly, based on sector-level data reported by *Technology Review*, the weighted average of R&D spending across all sectors of the global economy is estimated to be 8.5%.¹⁵ This suggests that 0.85% to 2.55% may be attributed to the absence of R&D expenditure for counterfeit goods, or a mid-range of 1.7 cents on the manufacturing dollar. That leaves a mid-range total of 3.77 cents on the manufacturing dollar that Chinese manufacturers save because of counterfeiting and piracy.
- 27 This is likely to be a conservative estimate. There are also more diffuse cost savings and it is far more difficult to estimate effects of counterfeiting and piracy not accounted for in these calculations. For example, legitimate companies face warranty costs, which often must be honoured even when a counterfeit part leads to failure. Legitimate companies also often incur costs of protecting their own intellectual property. Companies like Nike, Louis Vuitton, Microsoft and IBM now spend considerable sums on IP protection. They also suffer damage to their good will and reputation when counterfeit products fail (and fail to be recognised as counterfeits).

Driver #3: Minimal worker health and safety regulations

Yongkang, in prosperous Zhejiang province just south of Shanghai, is the hardware capital of China. Its 7,000 metal-working factories—all privately owned—make hinges, hubcaps, pots and pans, power drills, security doors, tool boxes, thermoses, electric razors, headphones, plugs, fans and just about anything else with metallic innards.

Yongkang, which means "eternal health" in Chinese, is also the dismemberment capital of China. At least once a day someone... is rushed to one of the dozen clinics that specialize in treating hand, arm and finger injuries, according to local government statistics.... The reality, all over China, is that workplace casualties have become

endemic. Nationally, 140,000 people died in work-related accidents last year... according to the State Administration of Work Safety. Hundreds of thousands more were injured.

The New York Times¹⁶

- 28 While the Chinese government instituted new health and safety laws in 1995, few enterprises, either public or private, abide by the laws. There is also very little enforcement by either the central government or local and provincial governments because the goal of economic growth has taken precedence. Nor does any properly functioning legal system exist to protect workers and insure fair compensation for those who are injured so the legal liabilities of Chinese manufacturing enterprises are very limited.
- 29 As a result, according even to China's own under-reported statistics, China is one of the most dangerous places to work in the world. The highest risk industries include building materials, chemicals, coal production, machinery manufacture, metallurgy, plastics and textiles. Diseases ranging from silicosis and brown lung to a variety of cancers caused by the ingestion, inhalation or contact with toxic chemicals and waste are endemic. Workplace injuries are endemic.
- 30 In this regard, there are those who may legitimately argue that the current relatively lax worker safety and environmental enforcement is a natural feature of China's stage of industrial development. In this regard, it is unlikely that China's lax regulatory environment is any worse than in the United States, Europe or even Japan at comparable earlier stages of their development. While this may be true, it is likely also true that this lax regulatory environment provides a cost advantage relative to other countries whose regulatory regimes are tighter. The goal of this analysis is simply to provide some albeit rough measure of this advantage.
- 31 As for the cost advantages to Chinese manufacturers inherent in a lax health and safety regulatory regime, these range from the use of cheaper equipment for workers and fewer safety-related expenses to savings on training and safety-related large capital expenditures. For example, Chinese textile companies are unlikely to invest in anti-noise or dust control equipment. Chinese coal mining companies tend to skimp on masks, goggles, and emergency rescue facilities while a wet drilling system costs as much as 60% more than a dry drilling system but significantly reduces hazardous dust emissions.
- 32 One way to estimate the cost advantage of China's lack of adequate health and safety regulations is to compare the expenditures on regulatory compliance in the United States versus China at the aggregate level. Specifically, the cost of regulatory compliance in the United States as a percentage of some relative metric, e.g., total cost or total revenue, can be used as a benchmark of comparison. Then, some fraction of that cost can be subtracted from the Chinese cost equation based on the looser standards.
- 33 A joint study by Mark Crain and Joseph Johnson (2001) was used as the US benchmark. It estimates health and safety compliance costs in the United States to be 1.6% of gross revenues.¹⁷ Under the conservative assumption that China spends a third of what the United States spends, this suggests that the contribution of lax health and safety

standards to the “China price” may be rather modest (the extreme pain and suffering of Chinese workers notwithstanding)—about one cent on the manufacturing dollar

Driver #4: Lax environmental regulations and enforcement

China’s population is so big and its resources so scarce that if we continue to ignore our environmental problems, that will bring disaster for us and the world.

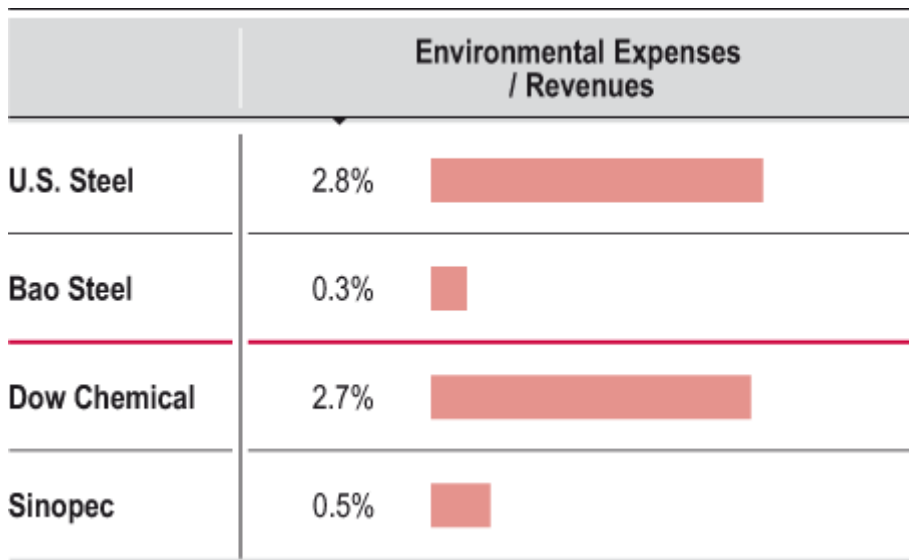
Pan Yue, Deputy Director, Chinese State Environmental Protection Administration¹⁸

- 34 China is rapidly becoming one of the most polluted countries in the world. It is home to 16 of the 20 the world’s most polluted cities. Of its almost one hundred cities with over a million people each, two-thirds fail to meet World Health Organisation (WHO) air quality standards.
- 35 China is also the world leader in the sulphur dioxide emissions and produces the second highest CO₂ emissions. It releases six hundred tons of mercury into the air annually, nearly one-quarter of the world’s non-natural emissions,¹⁹ and it is the world leader in the generation of substances that deplete the world’s ozone layer. Acid rain, which severely damages forests, fisheries, and crops, affects one-quarter of China’s land area and one-third of its agricultural land. As much as 50% of the acid rain in Japan and Korea is of Chinese origin. According to the Chinese Academy on Environmental Planning, more than 400,000 Chinese die prematurely from air pollution related diseases, primarily from lung and heart disease.²⁰ That number is expected to reach more than 500,000 within a decade.
- 36 The statistics on water pollution are equally stark. Of China’s seven major rivers 70% are severely polluted, and 80% fail to meet standards for fishing.²¹ 90% of China’s cities and 75% of its lakes suffer from some degree of water pollution,²² and 700 million Chinese “have access to drinking water of a quality below WHO standards.”²³ Liver and stomach cancers related to water pollution are among the leading causes of death in the countryside.²⁴ All of China’s coastal waters are moderately to highly polluted.²⁵
- 37 Not all of China’s air and water pollution can be blamed on its manufacturing industries. Other major sources include pesticide and fertiliser runoff in the agricultural sector and large quantities of human and animal waste that are dumped into waterways or seep into ground water. However, China’s industrial sector is the primary contributor of toxic (versus organic) pollution.
- 38 The worst polluting industries include paper and pulp, food, chemicals, textiles, tanning, and mining. The most common toxic pollutants include dioxins, solvents, and PCBs, various metals such as mercury, lead, and copper and highly persistent pesticides ranging from chlordane and mirex to DDT.²⁶
- 39 Many of the polluting factories are small-scale and locally owned. Even when such enterprises are highly unprofitable, they represent important job generators in rural areas plagued by high unemployment. That makes it very difficult for a local environmental protection bureau to either close the polluters down, fine them, or otherwise force them to comply with the pollution control standards.
- 40 In addition, in many cases, large factories equipped with the latest and most sophisticated pollution control technologies simply do not use the technologies for fear

of driving up production costs. Typically, this is done without any fear of sanctions by lax regulators and often complicit local officials.

- 41 While China has some strict environmental laws on the books, the fines that may be levied to enforce the regulations are so insignificant that they are seen merely as a cost of doing business rather than a true deterrent. Local authorities that collect the fines will often recycle the revenues back to the polluters as tax breaks.
- 42 A major problem with enforcement is that China's state environmental protection agency (EPA) is critically understaffed and under-budgeted. While the US EPA employs close to 20,000,²⁷ China's SEPA employs only 300. This is to oversee environmental protection in a country with over a billion people and with close to 100 cities of a million people or more. Finally, as with its weak health and safety regime, China's legal system makes it extremely difficult for pollution victims to properly seek any redress.
- 43 China's lax environmental regulations and weak enforcement provide a variety of cost advantages to its industrial sector. Enterprises save money by not buying protective equipment for workers. Many do not need to invest in pollution control technologies while those that do save money by not investing in them. Their waste disposal costs are thus considerably reduced.
- 44 The impact of these cost advantages on the China price may be estimated in two ways. First, in a variation on the approach taken earlier in measuring the impact of a lax health and safety regulatory regime, the costs of environmental regulatory compliance in China can be compared to that in the United States at the aggregate level under the assumption that Chinese manufacturers spend a fraction of what US firms do. Second, the results may be cross-checked by comparing actual expenditures of a few select Chinese and US firms in the same industries.
- 45 Using the first approach, Blodgett (1997) provides a summary of pollution control compliance costs in the United States that accounts for both capital expenditure and pollution abatement operating costs.²⁸ As a percent of value added, costs vary widely across industries. They range as high as 17% for petroleum, 9% for pulp mills, and 4% for chemicals to less than 1% for industries such as food, textiles and printing, with an overall average of 1.48%. Again assuming that China spends one-third of the amount that the United States spends, this suggests an effect of environmental compliance costs on the China price very similar to that of lax health and safety regulations of just about one cent on the manufacturing dollar (albeit considerably higher for certain industries).²⁹
- 46 Using the second approach, Table 3 compares annual environmental expenses as a percentage of gross revenues and costs for two pairs of companies in the relatively high polluting chemical and steel industries in China and the United States.³⁰

3. A Comparison of Environmental Compliance Costs in the Steel & Chemical Industries



- 47 US Steel reports spending roughly 3% of its revenues on environmental expenses. By comparison, China's Bao Steel spends only about one-tenth as much. The figures for Dow Chemical versus China's Sinopec are similar. This data lends support to the assertion that the assumption that China spends one-third that of the United States on regulatory compliance is a conservative one.
- 48 One final observation may be useful here. This relatively small contribution to the China price notwithstanding, China's environmental cost advantages at the individual enterprise level are likely being offset to a significant degree by the aggregate social costs. The World Bank estimates that pollution annually costs China between 8% and 12% of its more than US\$1 trillion GDP in terms of increased medical bills, lost work due to illness, damage to fish and crops, money spent on disaster relief, and so on.³¹ The useful policy point to make here is that a cost-benefit analysis would likely suggest that China could significantly improve its environmental regime without significant loss of competitive advantage and that the benefits of such a reform would likely far outweigh the costs.

Driver #5: Export subsidies

The subsidization of manufacturing by the Chinese government extends beyond what might be considered normal bounds to even include the acquisition of raw materials. A fellow NAM [National Association of Manufacturers] member in the copper industry tells us that exports of copper and brass scrap to China have increased about 50% a year for several years, driven in large part by a special subsidy of 30% of the VAT tax applied by the Chinese government to imports of scrap. This subsidy is given to the scrap consumer to invest in upgrading facilities. This subsidy amounts to about seven cents a pound of the copper content in a market where the successful bidder may be determined by a margin of a

quarter cent.

**Al Lubrano, President, Technical Materials,
Inc.³²**

China's state-run banks have routinely extended loans to state-owned-enterprises that are not expected to be repaid. And right now, the big four state banks in China are, for all practical purposes, insolvent.

**US-China Economic and Security Review
Commission³³**

Under state control, many Chinese state-owned manufacturers are operating with the benefit of state-sponsored subsidies, including: rent, utilities, raw materials, transportation, and telecommunications services. That is not how we define a level playing field.

**US Department of Commerce Secretary Donald
Evans³⁴**

- 49 As a condition of entry into the WTO, the Chinese government promised to eliminate, or greatly scale back, the complex web of subsidies and tax preferences that had benefited export manufacturers in the decade or more preceding its entry into the WTO in 2002. Because the Chinese government has not been fully transparent about its compliance with this condition, it is difficult to determine the degree to which this condition has been met. Some evidence does, however, suggest some potentially significant non-compliance.
- 50 First, energy and water remain heavily subsidised.³⁵ Many manufacturers likewise benefit from subsidised rent and/or cheap or free land and preferential access to land by local and regional governments. Assuming a subsidy level of one-third of the total costs for these cost components, this would add a modest 1.38 cents to the China price advantage.³⁶
- 51 Second, and of potentially more import, China's state-owned banks continue to hold a large portfolio of non-performing loans (NPL). These NPLs often have been issued without expectation of repayment. The biggest beneficiaries of this "free money" policy have been struggling SOEs, which are concentrated in heavy industries like steel and petroleum. Because of continued inefficiencies, many of these industries run at a loss. However, the Chinese government is loath to allow them to go bankrupt because of the loss of jobs that would entail. Accordingly, NPLs historically have represented a major lifeline to these enterprises, with the enterprises responsible neither for interest payments on these loans or repayment of principal.
- 52 Since entry into the WTO, the Chinese government appears to have attempted to clean up the existing NPL portfolios on the books of state-owned banks. There remains considerable controversy over how successful these efforts have been. On the one hand, the official rate of NPLs has fallen significantly in the last several years, from a reported 15% in 2003³⁷ to 8.6% in 2005.³⁸ On the other hand, outside observers have estimated that the percentage of NPLs is two to four times higher than the single-digit statistics now being officially reported.³⁹ In addition, according to a recent IMF study, China's state-owned banks continue to issue new NPLs.⁴⁰

- 53 To estimate the effect of NPLs on the China price, a rate of 15% is conservatively assumed. Under the additional assumption that interest rate payments on debt represent, on average, 3.44% of total costs,⁴¹ this suggests an advantage of 0.52 cents on the manufacturing dollar (with any such advantage heavily skewed towards sectors dominated by China's SOEs) or about one half of one cent.
- 54 Third, China continues to use an extensive value-added tax rebate system for its export industries. China's "VAT" is imposed over multiple stages of the domestic production and distribution process, generally in the range of 13% to 17%. In some cases, the Chinese government first collects, and then rebates, this tax for exports. In other cases, exporting firms are simply exempted from the tax..⁴²
- 55 In this regard, it may be argued that exempting exporters from payment of VAT on imported inputs is simply a way of levelling the playing field between exporters from countries in VAT regimes and those from non-VAT regimes. In this line of argument, an export VAT rebate is an export subsidy. Quite the reverse: if export VAT rebates are eliminated, this constitutes a tax on exports.
- 56 Whether or not one defines a rebate as a true subsidy, there is, nonetheless, significant evidence that the use of VAT tax rebates represents a violation of the WTO rules against export subsidies. Perhaps the most compelling piece of evidence is the fact that the Chinese government voluntarily suspended the VAT tax rebate in a number of industries, including most prominently semiconductors, after threats from the United States of filing WTO complaints.⁴³
- 57 In the cost structure of US manufacturers, value-added represents 35.8% of the current-dollar gross output of the manufacturing sector.⁴⁴ Assuming an average VAT rate of 15%, this suggests a tax benefit of 5.4 cents to the China price dollar.
- 58 The analysis yields, then, a total contribution of export subsidies to the China price of 7.3 cents. As with many of the estimates in this analysis, it is likely to be a conservative estimate as it does not include other possible sources of subsidies such as other forms of tax relief, "government contracts with payments well below costs and privileged use and retention of foreign exchange earned from exports."⁴⁵

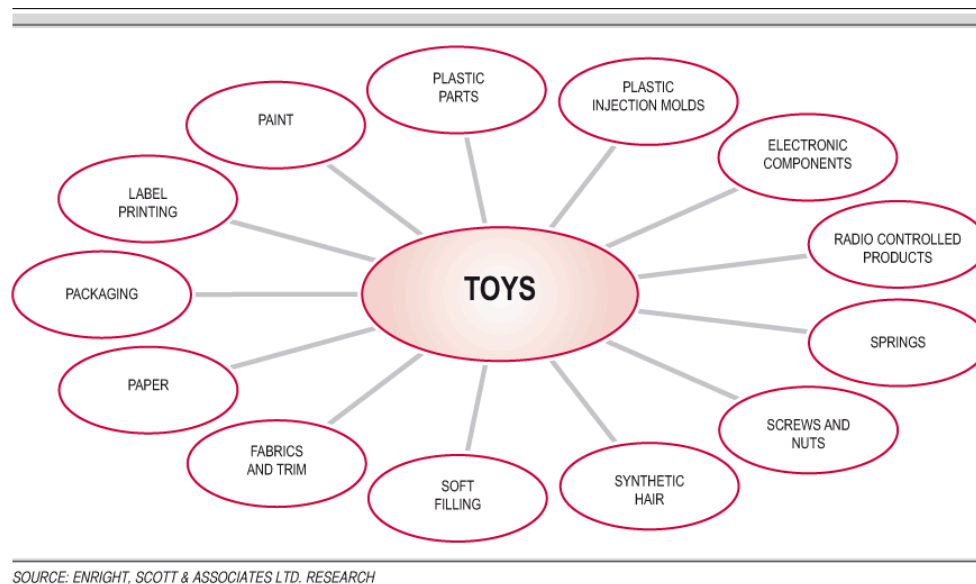
Driver #6: Industrial network clustering

National and regional economies tend to develop, not in the isolated industries, but in clusters of industries related by buyer-supplier links, common technologies, common channels or common customers. The economies of the Pearl River Delta region are no exception. The region has developed a broad range of clusters in garments and textiles, footwear, plastic products, electrical goods, electronics, printing, transportation, logistics, and financial services. The Pearl River Delta region's electronics and electrical cluster is particularly strong and accounts for the vast majority of Chinese production in a wide range of industries....

Regional Powerhouse⁴⁶

- 59 Industrial network clustering refers to the practice of locating all or most of the key enterprises in an industry’s supply chain in close physical proximity to one another. Examples of such clustering abound and include Detroit as the “motor city” hub for auto and auto parts manufacturing, New York as a financial centre, Silicon Valley as a nexus for technology, and so on. What is different about industrial network clustering in China is not just its large scale and broad scope. It is also the emergence of a myriad of “supply chain cities” that focus on a single product or set of products and serve as the focal points for highly localised supply chains.⁴⁷
- 60 For example, in the Pearl River Delta area of China, the city of Huizhou has emerged as the world’s largest producer of laser diodes and a leading DVD producer. Foshan and Shunde are major hubs for appliances like washing machines, microwave ovens, and refrigerators. Dongguan’s Qingxi Township is one of the largest computer production bases in China. Hongmei focuses on textile- and leather-related products, Leilu on bicycles, Chencun on flowers, Yanbu is the underwear capital, and so on.⁴⁸
- 61 This type of localisation of industrial focus generates significant production and distribution benefits as it speeds both physical and information flows and extends “just in time” principles to the entire supply chain. In this regard, China’s unique form of industrial network clustering is quite different from the “just in time” form of supply chain management that triggered the vaunted Japanese miracle of the last century.
- 62 In the Japanese model, the various parts necessary for production arrive from all over the world literally just in time for assembly and manufacturing. Chinese enterprises, often with the synergistic and catalytic help of FDI, have taken this system one level higher by quickly transforming whole cities and towns and tens of thousands of acres of “green field” farmland into industrial production sites. In this model, Chinese manufacturers do not have to rely on an elaborate and globally dispersed supply chain like the Japanese. Instead, many of the various factors of production are located in close proximity to each other in any given industrial network cluster.
- 63 Figure 1 illustrates the well-known toy cluster in Guangdong province. Virtually every single factor needed for toy production is produced in very close proximity to the major toy manufacturers. These factors range from packaging, plastic parts, paint and label printing to springs, screws and nuts, soft filling and synthetic hair.

Figure 1. The Toy Cluster of Guangdong Province



- 64 In terms of direct cost reduction benefits to the China price, clustering reduces transportation costs by locating factors of production closer to one another. It reduces inventory costs by speeding up throughput times. It reduces “line down time” costs caused by broken links in the supply chain, e.g., a firm lacking a key input is able to secure that input more quickly.
- 65 Indirectly, network clustering also generates significant positive information externalities in the form of technology spillovers, knowledge sharing among competitors, and the localised flow of industry information. Firms likewise face reduced search costs while infrastructure costs to both private enterprises and the government are reduced because of the compactness of the supply chain and production grids.
- 66 Case analyses of the air conditioner and tannery industries conducted as part of the China price Project suggest that the direct benefits of network clustering alone lead to a 10% to 16% reduction in fixed and operating costs.⁴⁹ Assuming that raw materials represent 46% of the manufacturing dollar,⁵⁰ this suggests savings in the range of 5.4 cents to 8.6 cents per manufacturing dollar from the direct cost reduction benefits alone.

Driver # 7: The catalytic role of FDI

[A]s capital floods in and modern plants are built in China, efficiencies improve dramatically. The productivity of private industry in China has grown an astounding 17% annually for five years....

Business Week⁵¹

[A] major driver of Chinese productivity gains has been the rapid growth of foreign and foreign-invested firms. These ventures represent foreign direct investment—long-term investments in the Chinese economy that are directly managed by a foreign entity. Close oversight of these operations

by experienced foreign managers provides for the transfer of modern technical and managerial techniques, leading to higher productivity levels. In fact, joint ventures of foreign companies with Chinese firms are seven times as productive as state-owned operations and over four times as productive as domestically run private enterprises.

The US Conference Board⁵²

- 67 Among developing nations, China has become the leading destination of FDI. Since 1983, FDI has grown from less than US\$1 billion a year to over US\$60 billion. 72% of China's FDI targets manufacturing.
- 68 Of China's FDI 20% to 30% is estimated to be of domestic origin. It is the result of the "round tripping" of mainland Chinese capital, primarily through Hong Kong (and also the Virgin Islands). This round tripping is driven by the special preferences awarded to FDI in the form of lower tax rates, land-use rights and subsidies, administrative support, and other subsidies (most of which represent violations of the WTO) as well as by a desire to evade foreign exchange controls.⁵³
- 69 Other major FDI participants include the United States, Japan, Korea and Taiwan. While the availability of cheap labour and the allure of China's large and largely untapped consumer market certainly play a major role in attracting these participants, lax environmental and health and safety regulatory regimes synergistically factor into the FDI decision. In this regard, multinationals are increasingly being criticised within China for exporting their pollution to the mainland.
- 70 In addition, China's undervalued currency also provides considerable FDI synergy. An undervalued yuan makes Chinese assets appear relatively cheap to foreign investors.
- 71 China's catalytic FDI provides a variety of competitive benefits. It finances the transfer of the most technologically advanced production and process technologies. It has brought with it managerial best practices and skills as many FDI-financed enterprises are managed by foreign talent. FDI is also often tied to the improvement of both marketing and distribution skills. When all of these attributes are tied to one of the least expensive labour forces in the world, FDI becomes a powerful competitive driver.
- 72 While identifying the many benefits of FDI qualitatively is relatively straightforward, quantifying those benefits regarding the China price is inherently more difficult and therefore, of all of the China price drivers analysed, this is the most speculative. The approach taken begins with the observation that FDI has played a key role in generating the robust rates of productivity growth observed in China. Various sources place this rate in the range of 8.5% annually since 2000.⁵⁴ This compares to a rate of 4.9% in the US manufacturing sector over a similar time period.⁵⁵ However, China's rate is also likely to be much higher in industries where FDI has been particularly heavy.
- 73 Consider China's textile industry. It has been the largest purchaser of both new shuttleless looms and spinning equipment in recent years, much of it paid for with FDI. The result is that Chinese textile workers now enjoy similar rates of high productivity as US textile workers.⁵⁶
- 74 In labour markets characterised by the lack of surplus labour, productivity gains normally translate into wage increases rather than price reductions. However, in

China, there is little evidence other than some minor wage inflation in the coastal areas to suggest that the decreases in production costs from increases in productivity are being offset by rising labour costs. It follows that China’s annual productivity gains are providing Chinese enterprises either with the opportunity to lower prices or monetise the productivity gains as increased profits.

- 75 Additional evidence suggests that China’s productivity gains are likely being translated into price maintenance or price reductions rather than in the distribution of profit. Rates of return on capital are relatively low in China on a risk-adjusted basis.⁵⁷ There is also growing surplus capacity in many industries and intense competition among Chinese firms—often all the more intense because of network clustering.
- 76 Based on these observations, it is possible to first surmise that some fraction of China’s rapid productivity growth is being driven by FDI. This is a finding consistent with the work of Yu Chen and Sylvie Démurger (2002), who found a clear link between higher rates of productivity and FDI.⁵⁸ What is interesting here, however, is that such rapid labour productivity growth alone is unlikely to have a sizeable effect on the China price precisely because labour costs are so low, e.g., an 8.5% rise in productivity would lower the China price by less than half a cent on the manufacturing dollar in any given year.
- 77 It is highly unlikely, however, that the productivity gains from catalytic FDI are being limited to a single factor of production, i.e. labour. Rather, a more realistic assumption is that FDI has provided a spur to *total factor productivity* growth. That is, in a “KLEMS model framework”, FDI allows Chinese manufacturers to use all four major factors of production—capital, labour, energy and raw materials—more efficiently.⁵⁹
- 78 Under the conservative assumption that the rate of total factor productivity growth is comparable to the rate of labour productivity growth in China, one can postulate a net annual gain in total factor productivity of 3.6% relative to US manufacturers. If one-quarter to one-half of this productivity gain is attributable to FDI, this suggests an annual *recurring* benefit of 0.9 to 1.8 cents on the manufacturing dollar, modest in any one year but arguably quite significant over time as benefits compound.

Driver #8: A chronically undervalued currency

China's undervalued currency encourages undervalued Chinese exports to the US and discourages US exports because US exports are artificially overvalued. As a result, undervalued Chinese exports have been highly disruptive to the US and to other countries as well, as evidenced by trade remedy statistics.

US-China Economic and Security Review Commission⁶⁰

Greater scope for market forces to determine the value of the RMB would also reduce an important distortion in the Chinese economy, namely, the effective subsidy that an undervalued currency provides for Chinese firms that focus on exporting rather than producing for the domestic market.

US Federal Reserve Chairman Ben Bernanke⁶¹

- 79 Since 1994, China has pegged its currency, the yuan, to the US dollar at roughly an 8-to-1 ratio. Under pressure from the United States and the international community, China adopted a “managed float” regime in 2005 based on a market basket of currencies. For all practical purposes, however, the dollar peg remains intact; and the yuan remains, by most estimates, considerably undervalued. Table 4 provides a representative sample of some of the more credible estimates of the degree of this undervaluation, as well as the estimation methods used.^{62, 63}

Table 4: Chinese Yuan Versus U.S Dollar Undervaluation Estimates

Source	Range	Method
Coudert & Couharde (2005)	44%	Fundamental Equilibrium Exchange Rate (FEER)
Preeg (2002)	40%	Fundamental Equilibrium Exchange Rate (FEER)
Williamson (2003)	Over 25%	Fundamental Equilibrium Exchange Rate (FEER)
Goldstein (2003)	15-25%	Fundamental Equilibrium Exchange Rate (FEER)
Funke & Rahn (2005)	8-12%	Permanent Equilibrium Exchange Rate (PEER)
Yang and Bajeux-Besnainou (2004)	0%	Purchasing Power Parity (PPT)









- 80 To calculate the effect of an undervalued currency on the China price, this analysis will use a mid-range estimate of 20%. Note that even such a mid-range estimate is highly speculative; and despite numerous studies, the question of the extent of the exact subsidy remains equally speculative. (Those who take the view that China’s currency may be closer to fair value than many studies suggest rightfully point out that Chinese exports remained highly competitive internationally even in the late 1990s, when all estimates suggested that the yuan was overvalued.)
- 81 In this calculation, a common error is to assign a “one-to-one” correspondence between the degree of undervaluation and the cost advantage to exporters. However, it is critical to also take into account the *import content* of exports. Any benefits from selling exports with an undervalued currency will be at least partially offset by the need to buy from foreigners the raw materials, electronic components, and other imported inputs used in the manufacturing process with that same weak currency.
- 82 The import content of most Chinese manufactured goods has been estimated to be quite high, which substantially mutes the currency effect. Lawrence Lau (2003)⁶⁴ and William Overholt (2003) suggest that this content is in the range of 75%.⁶⁵ Based on this estimate and an assumption of a currency undervaluation of 20%, the contribution of

an undervalued currency to the China price is five cents on the manufacturing dollar. In highly competitive global markets.

Summary, limitations, and strategic and policy implications

- 83 Table 5 provides a summary of the relative contributions by percentage of each of the eight major economic drivers of the China price using the mid-range estimates developed in the preceding analysis. Given the difficulty of obtaining accurate and reliable data and the need for some simplifying assumptions, these estimates are likely to have a wide margin of error. However, they do provide some important perspective on the *relative* importance of the various sources of competitive advantage in China.

5. Relative Contributions of the Eight China Price Drives

Wages	39.41%	
Subsidies	16.71%	
Network Clustering	16.02%	
Undervalued Currency	11.44%	
Counterfeiting & Piracy	8.63%	
FDI	3.09%	
Health & Safety	2.44%	
Environmental	2.26%	
TOTAL	100%	

- 84 Lower labour costs account for 39% of the China price advantage and clearly represent the dominant driver. This finding suggests that more than one-third of China's competitive edge is driven by a “fair” advantage in a “free trade” environment, i.e., China's comparative advantage in labour resources. However, China's labour advantage has not gone without criticism with respect to unfair trading practices. As noted in a petition by the US AFL-CIO to the Office of the US Trade Representative, “workers in China frequently are paid less than the country's minimum wage, denied overtime pay, denied collective bargaining rights and often subjected to abusive treatment.”⁶⁶
- 85 Industrial network clustering provides another 16% of the China price advantage, and this is perhaps the most important area where foreign competitors have the most to learn from Chinese manufacturers in the free and fair trade arena. As noted in the text, the scale and scope and high evolutionary form of this supply chain management practice is unparalleled in the world, and provides China with a significant cost advantage. Both foreign corporations and other countries have much to learn from this technique.
- 86 Five of the remaining economic drivers of the China price are those which have been widely criticised as constituting unfair trade practices. Export subsidies account for 17% of the advantage, an undervalued currency adds 11%, and counterfeiting and piracy

contribute 9%. Lax environmental and worker health and safety regulatory regimes add another 5%. Together, these drivers account for 41% of the China price advantage.

- 87 Lastly, there is the driver of FDI to consider. It provides 3% of the China price advantage—and likely a much greater cumulative contribution over time. As previously noted in this analysis, FDI is arriving in China for at least some reasons other than a legitimate attraction to cheap labour and a desire to gain a foothold in what may soon be the world’s largest and most lucrative consumer markets. One major aspect of China’s FDI that falls into a grey area of potential unfair trading practices is the widespread “round tripping” of domestic Chinese capital to avoid currency controls and gain preferential treatment regarding such elements as taxes, subsidies and access to land. Other aspects of FDI which are open to criticism from a fair trade perspective include the desire of foreign corporations to manufacture under far laxer environmental and health and safety regulatory regimes.
- 88 Future research may wish to focus on developing a more comprehensive database and refining the methodologies offered in this study. Future research may also want to better address issues of comparability and engage in a more fine-grained, sector-by-sector analysis to determine how the China price advantage varies across industries. Lastly, future research may want to look at the effects of FDI on the China price in a more dynamic framework.
- 89 In the meantime, the limitations of this analysis notwithstanding, this snapshot of Chinese competitiveness represents the first scholarly effort to disaggregate the many drivers of Chinese competitive advantage. By doing so, it provides both business executives and policy-makers with useful insights about how to respond to intense competitive pressures in a global economy.
- 90 *The China Price Project was conducted at the Merage School of Business from October 2005 to March 2006 as an experiential, multidisciplinary and integrative class exercise. An initial discovery phase identified the major economic drivers of the China price. Students then participated in two additional phases. The first phase focused on a detailed team analysis of each of the eight specific economic drivers of the China price. Industry analyses were conducted in the second phase. I’d like to thank all those students who participated in this project. For a full roster of these students and the various project phases they participated in, please visit <http://www.peternavarro.com/chinaprice.html>*

NOTES

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ABSTRACTS

Chinese manufacturers have the capability to significantly undercut prices offered by foreign competitors over a wide range of products. Today, as a result of the “China price,” China has captured over 70% of the world’s market share for DVDs and toys, more than 50% for bikes, cameras, shoes and telephones, and more than one-third for air conditioners, colour televisions, computer monitors, luggage and microwave ovens. It has also established dominant market positions in everything from furniture, refrigerators and washing machines to jeans and underwear (yes, boxers and briefs).

This article examines the eight major economic drivers of the China price and provides estimates of their relative contributions to China’s manufacturing competitive advantage. Lower labour costs account for 39% of the China price advantage. A highly efficient form of production known as “industrial network clustering,” together with catalytic foreign direct investment, add another 16% and 3%, respectively. The remainder of the China price advantage is driven by elements challenged as unfair trade practices by foreign competitors. These include export subsidies, which account for 17% of the advantage, an undervalued currency (11%), counterfeiting and piracy (9%), and lax environmental and worker health and safety regulatory regimes (5%).