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Source: *Asian Survey*, Vol. 43, No. 4 (July/August 2003), pp. 681-696

Published by: [University of California Press](#)

Stable URL: <http://www.jstor.org/stable/10.1525/as.2003.43.4.681>

Accessed: 29/06/2013 00:41

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TAIWAN'S DILEMMA ACROSS THE STRAIT

Lifting the Ban on Semiconductor Investment in China

Chyan Yang and Shiu-Wan Hung

Abstract

For more than two decades, Taiwanese semiconductor manufacturers have been banned from investing in China. There was a heated debate in 2001–02 for several months over whether to lift the ban. The purpose of this study is to report the dilemma that the Taiwanese government faced during the debate, and the decision-making process of allowing Taiwanese integrated circuit foundries to invest in China.

Introduction

Political ill will between China and Taiwan has existed for more than half a century. China has continued a massive build-up of missiles along its eastern coastline, in a manifestation of rising tensions with Taiwan. On April 2, 2002, the *Washington Post* reported that according to American intelligence estimates, China had deployed 350 to 400 short-range ballistic missiles, positioned within striking distance of Taiwan.¹ Despite the military threat from China, however, Taiwan's information technology (IT) firms, over the past two decades, have continued to sail across the strait for

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Asian Survey, 43:4, pp. 681–696. ISSN: 0004–4687

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1. Elan Berman, *Missile Defense Briefing Report*, no. 47 (Washington, D.C.: American Foreign Policy Council, 2002).

cheaper land and labor.² Sectors that made significant shifts to China in the year 2000 ranged from motherboards and monitors to scanners, cases, CD-ROMs and DVD-ROMs, and desktop PCs. China leapfrogged Taiwan as an IT hardware manufacturer for the first time in 2000, placing itself third in the world behind the United States and Japan. Many Taiwanese companies have funneled money to China through third countries and subsidiaries, in order to skirt the government's investment cap, enacted in 1996 after a wave of investment in China resulted in a string of Taiwanese corporate bankruptcies. There is a fear that the Taiwanese manufacturing sector could be swallowed up by China.

While past efforts to restrain investment were designed to prevent China from gaining an economic or technological advantage over Taiwan,³ two new factors have forced the government in Taipei to rethink its strategy: a sagging economy and Taiwan's January 1, 2002, entry into the World Trade Organization (WTO). With the economic problems over the last three years, especially in 2001, industry executives are hoping that the opportunity for Taiwan's manufacturers to expand and flourish more in China will result in a stronger local economy. The WTO entry for both China and Taiwan is pressuring Taiwanese officials to dismantle trade barriers.

Although the island still maintains a big edge over China, with its dominance in computer chip manufacturing, this edge may gradually vanish if Taiwan's semiconductor manufacturing migrates more and more to China. For the past few years, Taiwanese semiconductor manufacturers, which pay a major role in the high-tech sector of Taiwan's IT industries, have been banned from investing in China. Owing to growing Chinese market demand, however, there was a heated debate from August 2001 to April 2002 over whether to allow Taiwanese investment in China aimed at producing 8-inch (200 mm) wafer fabrications, the highest-tech sector of Taiwan's industries. The Taipei government took a long time before deciding to permit limited investment under certain circumstances, because opponents were citing national security as a major concern. For more than five decades, Beijing has seen Taiwan as a renegade province, and has threatened to use force if necessary to bring about reunification. Industrial and government officials are still hammering out an agreement on what will stay and what will go, with hopes that they can come away saying something cheerful about the future of the island's core semiconductor industry, the chip foundries.

This study reports on the dilemma the Taiwanese government faced during the debate, and the decision-making process of allowing Taiwanese inte-

2. K. M. Sutter, "Business Dynamism across the Taiwan Strait: The Implications for Cross-strait Relations," *Asian Survey* 42:3 (May/June 2002), pp. 522-40.

3. P. Deng, "Taiwan's Restriction of Investment in China in the 1990s: A Relative Gains Approach," *ibid.*, 40:6 (November/December 2000), pp. 958-80.

grated circuit (IC) foundries to invest in China. An unprecedented concatenation of four circumstances has turned the decision-making process into an ordeal for Taiwanese business:

1. the political power shift from the long-ruling Kuomintang, or Nationalist Party (KMT) to the Democratic Progressive Party (DPP);
2. a deteriorating unemployment rate;
3. rising demand for IC chips within the semiconductor industry in China in response to the country's open-door policy;
4. urgent desire in the Taiwan semiconductor industry to relocate foundries to China, in order to stay close to the customer base.

Ideologically, some pro-DPP economic fundamentalists oppose lifting the ban, while DPP members who believe in a free economy have supported lifting the ban.

This article introduces an overview of Taiwan's semiconductor industries, as well as the government's role in those industries. The radical political change within the Taipei government during the past three years is discussed. In addition, we explore the opportunities and dangers of investing in China, and the dilemma faced by the government, as well as the decision-making process on semiconductor investment in China.

Taiwan's Semiconductor Industry and the Government's Role

Taiwan's semiconductor industry as a whole is prominent, and is the fourth-largest in the world. The industry has existed in Taiwan for over 30 years, since construction of the first semiconductor plant in Kaohsiung, in 1966. Nowadays there are over 100 semiconductor plants on the island, creating an output worth US\$25 billion in 2001.⁴

Since 1960, the Taiwanese government has played a leading and direct role in the institutional set-up of Taiwan's semiconductor industry. To encourage domestic companies to invest in research and development (R&D), the government offers firms attractive terms for setting up a business, as well as a range of taxation benefits and allowances. Other incentives or subsidies include low-interest loans, an R&D matching fund, tax credits, tariff exemptions, and tax relief. Moreover, the government promotes R&D in the IC industry through the Industry-University Cooperation Program of the National Science Council. The program encourages academics to learn about the technology required for integrated circuits, and assists in establishing good relationships between academia and the semiconductor industry. In ad-

4. *Year Book of Taiwan Semiconductor Industries* (Hsinchu, Taiwan: Industrial Technology Research Institute, 2001) pp. 30–45.

dition, the Ministry of Economic Affairs sponsors bridging institutions to focus on R&D of applied technology, with concrete results transferred to plants. Companies are encouraged to participate in programs that focus on the development of new products, and to build up R&D teams to promote industrial R&D capabilities. Through all these programs, several sectors of the IC industry (including the IC foundry and IC fables)⁵ have developed their own R&D capability, which in turn have boosted the R&D capability of the industry cluster.

With the government's strong support, Taiwan has created its own "Silicon Valley" cluster in the Hsinchu Science-Based Industrial Park. The park houses almost all of the Taiwan semiconductor firms engaged in the IC business: from design, to chip fabrication, testing and assembly, and the utilization of chips in system products such as computers, hubs, switches, scanners, etc. An essential aspect underlying the IC industry cluster is the development of close cooperative relationships. The strength of Taiwan's IC industry can be attributed to its vertical disintegration. Basically, there are two types of IC production systems. The first type is Integrated Device Manufacturing (IDM), which includes IC design, fabrication, packaging, and testing in one company. The United States, Japan, and Korea have active IDM companies (such as Intel, Texas Instruments, and Motorola in the U.S.; NEC and Toshiba in Japan; and Samsung in Korea). The other approach to IC consists of separate and independent production systems, i.e., design, wafer fabrication, mask generation, IC fabrication, IC packaging/testing, etc. These are all separate companies. Each of these companies concentrates only on one specific procedure (item) of the IC production process.

Within the cluster, reflecting a long-term commitment, the IC design and IC foundry aspects may develop complex relations to develop new IC products. Three types of interactive relations are evident within the cluster network system: personnel interaction, technological interaction, and informational interaction. IC design companies can always find other sources of support, such as foundry houses or packaging/testing houses within the cluster. This network system structure supports a high level of interdependency in the industry cluster, enabling greater technological diffusion, facilitating tighter communication and cooperation, and supporting the development of new integrated circuits.

The foundry industry was developed in the 1980s and rose rapidly to become the core of the IC design industry. The interaction of the professional foundry industry and the IC design industry in Taiwan has been very successful. The IC fabless industry does not experience massive depreciation of

5. Fab (fabrication) and Fabless (no fabrication) are the terms used to distinguish whether IC firms manufacture their own chips.

equipment, and the innovative products themselves create high value-added profit. Therefore, the growth rate of the IC foundry has been outstanding within the entire semiconductor industry, and has created decent results even during the recession. Taiwan Semiconductor Manufacturing Corporation (TSMC) and United Microelectronic Corporation (UMC) are the world's biggest "pure-player" foundries: they do not have their own products, and only manufacture chips for other firms. Together, they hold about two-thirds of the world market share. Both TSMC and UMC already have the most advanced 12-inch (300 mm) wafer (fabs) in Taiwan, making thousands of wafers per month.

Up to the present, the Taiwanese government has continued to maintain, if not enhance, its role in technological and industrial development. Government involvement, however, has gradually shifted from a key position to a promotional and support role for Taiwan industry. Nonetheless, the government wants some control over how rapidly IT firms sail across the Taiwan Strait.

The Radical Change in the Political Environment of Taiwan

In addition to its changing role vis-à-vis the semiconductor industry, the government itself experienced a radical political change in 2000 and 2001. In the March 2000 elections, Taiwan's DPP candidate Chen Shui-bian won the presidency. As Y. S. Wu has pointed out, although this was a milestone in Taiwan's political development, ending more than 50 years of Kuomintang rule, Taiwan was suddenly caught up in unprecedented conflict between the new president and the KMT-dominated Legislative Yuan (Congress).⁶ Local political uncertainty and the global economic recession, as well as the DPP's pro-environment and pro-welfare policies, put Taiwan's economy into a depression. In addition, President Chen and his KMT opponents collided over the issue of what is called the Fourth Nuclear Power Plant.⁷ The decision to stop continual nuclear plant construction damaged Taiwan's international credibility for long-term construction contracts. Domestic investors not only worried about the new government's commitment to economic development, but also feared sharp rises in electricity prices and power shortages. Chen's first premier, Tan Fei, resigned under great pressure, after a four-month term. In addition, the way that the decision was made to stop construction sharp-

6. Yu-Shan Wu, "Taiwan in 2000: Managing the Aftershocks from Power Transfer," *Asian Survey* 41:1 (January/February 2001), pp. 40–48.

7. See Yu-Shan Wu, "Taiwan in 2001: Stalemated on All Fronts," *ibid.*, 42:1 (January/February 2002), pp. 29–38. The Fourth Nuclear Power Plant has been a major issue for debate between the two major political parties, the KMT (pro-economic development) and the DPP (pro-environmental protection).

ened the conflicts between the DPP and KMT, which led to the opposition's campaign to impeach Chen. Beyond its pro-environment stance, the DPP also had long held pro-welfare policies. The new government's budget also showed its intention to increase spending for social welfare. All these factors contributed to the economic decline of the island, as proposed by both Wu and Rigger.⁸

Although the ruling DPP government attempted rescue plans for the economy, including interest-rate cuts and direct interventions into the stock market through the National Stabilization Fund, as T. Y. Wang has noted, it still faced an unprecedented economic crisis, accompanied by a domestic political standstill and cross-strait political deadlock.⁹ In an effort to resolve the economic crisis, Chen Shui-bian, in a televised speech May 18, 2001,¹⁰ proposed convening an Economic Development Advisory Conference (EDAC, or Jingfahui). He said that the greatest challenges for the country at that point lay in deciding how to cope with global economic recession and the structural transformation of local industry.

In August, President Chen personally chaired the conference, inviting representatives from the ruling and opposition parties, scholars, business leaders, and blue-collar workers to contribute their wisdom to the nation's long-term economic development. By so doing, it was hoped that most suitable remedial measures could be worked out, thereby furthering implementation of the three priority policies: Taiwan first, economy first, and investment first. A consensus on a total of 322 action items was reached; the most important ones related to cross-strait economic activities, including to¹¹

- form a task force consisting of representatives from the industrial, government, and academic sectors to conduct regular reviews on the easing of investment restrictions for selected industries and products on the Chinese mainland;
- relax restrictions on capital investment on the Chinese mainland and establish a risk-management mechanism;
- establish a sound auditing mechanism to review financial statements for mainland-bound investments, and strengthen transparency for such information;
- allow enterprises to make direct investments on the mainland, as long as related measures regarding investment security can be ensured;

8. Ibid.; Shelley Rigger, "Why Taiwan's Political Paralysis Persists," Foreign Policy Research Institute, <<http://www.fpri.org/enotes/asia.20020418.rigger.taiwanpoliticalparalysis.html>>, April 18, 2002.

9. T. Y. Wang, "Cross-strait Relations after the 2000 Election in Taiwan: Changing Tactics in a New Reality," *Asian Survey* 41:5 (September/October 2001), pp. 716–36.

10. Office of the President of the Republic of China, *Background for Convening the Economic Development Advisory Conference*, <http://www.president.gov.tw/2_special/economic/e_index.html>, May 2001.

11. Mainland Affairs Division, *Economic Development Advisory Conference Final Summary Report*, <<http://www.gio.gov.tw/taiwan-website/>>, August 26, 2001.

- in accordance with the changes taking place in policies on mainland-bound investments, allow businesses and enterprises from Taiwan that are already investing there, but have not yet obtained permission to do so, to make the appropriate adjustments retroactively;
- strengthen the guidelines for mainland-bound industries, and give greater assistance to Taiwan businesses to reduce investment risks;
- promote the signing of cross-strait agreements in order to protect Taiwan investment and guarantee fair taxation for such investments.

In his closing address at EDAC, Chen promised that the Republic of China (R.O.C.) government would maintain a stable cross-strait policy.¹² A flexible mechanism for the flow of capital between Taiwan and the mainland would be established, and the initiative would be taken in preparing for the opening of the “three links” (trade, transport, and mail)¹³ and accession to the WTO by both sides. The government would also continue to push for bilateral dialogue.¹⁴ The EDAC and its consensus laid the first step for lifting the ban on semiconductor investment in China.

Semiconductor Investment in China: Opportunities and Dangers

China is both a danger and an opportunity for Taiwan’s semiconductor industry. Since 1978, China has seen an average real growth rate, with increasing stability, of more than 9% per year. In several peak years, the economy grew more than 13%. Income per capita has nearly quadrupled in the last 15 years, and a few analysts are even predicting that the Chinese economy will be larger than that of the United States in about 20 years.¹⁵ Such economic growth comes with a large demand for ICs for various applications, such as computers, consumer electronics, and communications equipment. Figure 1 shows the already-large and rapidly growing China IC market from 1995 to 2000. China’s consumer electronics IC market alone reached \$7.1 billion in 2001, relying on imports for more than 90% of that figure and revealing a massive potential for domestic growth.

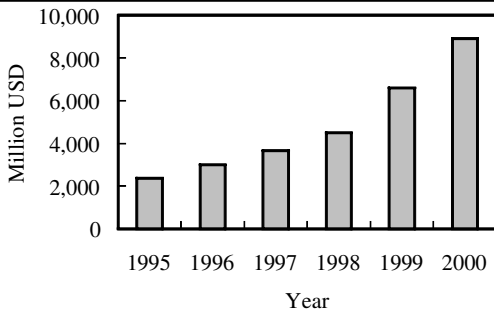
Most Taiwanese manufacturers are interested in owning a slice of this China pie, especially TSMC and UMC. Both are anxious to tap the Chinese

12. S. B. Chen, “Economic Development Advisory Conference Closing Address,” Government Information Office, R.O.C., August 26, 2001.

13. “Cross-Strait Relations and Economics Policies toward Mainland China,” Mainland Affairs Council, Taipei, 1997.

14. “President Chen Chairs a Conference Reviewing the Progress of the EDAC,” Office of the President of the Republic of China, <<http://www.president.gov.tw/php-bin/prez/showenews.php4>>, August 25, 2002.

15. Z. Hu and M. S. Khan, *Why Is China Growing So Fast?* International Monetary Fund, June 1997.

FIGURE 1 *China's IC Market Demand*

SOURCE: *Year Book of Taiwan Semiconductor Industries* (Hsinchu, Taiwan: Industrial Technology Research Institute, 2001), pp. 30–45.

market, which TSMC chairman Morris Chang has predicted would grow 20% per year for the next 20 years.¹⁶ The foundries hailed China's admission to the WTO and predicted that WTO membership would accelerate the influx of foreign original equipment manufacturers (OEMs) and contractors into the country, further increasing the firms' customer base. WTO membership is also designed to bring China into line with standard global business practices. Chinese business practices will become increasingly governed by standards of law, which will benefit everyone. It has been reported that "both TSMC and UMC have made preliminary moves into China, sending representatives to scout site locations near Shanghai."¹⁷ UMC has been more aggressive, selling used 8-inch (200 mm) production lines that many believe will end up in a still-undisclosed UMC venture in China.

Across the strait, China hopes to challenge Taiwan's foundry supremacy with a batch of foundries planned for two technology parks. In January 2001, an 8-inch, 0.25-micron¹⁸ foundry launched at a new government/industry "microelectronics industry base" at the Badachu Science and Technology Park was the first of eight production lines and, as S. Liu notes, "a parallel

16. J. Robertson, "China Said to Trump Taiwan in Fab Costs," EBN, <<http://www.siliconstrategies.com/story/OEG20020329S00396>>, March 29, 2002.

17. J. Robertson, "Let Them Come, Chinese Foundries Say to Competition," EBN, <http://www.siliconstrategies.com/printableArticle?doc_id=OEG20020329S0039>, March 29, 2002.

18. For years, "feature size," the width of the semiconductors and their interconnections on a chip, has been gradually reduced, which lets designers pack more transistors into the same area. For most of the advanced chips in production, feature size is 0.25 micron. However, the leading edge in chip making is 0.18 micron and heading toward 0.15, which is about as thin as any fab now at 0.25 can handle by modifying its machines.

effort was underway at a technology park in Shanghai.”¹⁹ The foundry business mainly focused on analog and other semiconductors, with intent to challenge TSMC as the top analog foundry. With all products slotted for export initially, overseas design houses were the primary customers.

Earlier, the Shanghai Grace Semiconductor Manufacturing Corporation (GSMC) had broken ground for a new plant at Zhangjiang Science Park in Shanghai.²⁰ GSMC is a joint venture of international inventors from China, Japan, South Korea, and the United States. Some of the investors have strong ties with and experience in Taiwan. With a total investment of \$1.63 billion, GSMC is targeting both the semiconductor and foundry markets in and outside China.

China has significant cost advantages over its rival Taiwan in constructing and operating wafer fabs. For example, construction costs in Shanghai are 35% less expensive overall than those in Taiwan. The water supply is 60% less expensive, and the bulk gas costs are 30% lower than in Taiwan. In addition, the Central China Information Department reported that in 1999, domestic firms, both joint ventures and Chinese-owned, were able to supply only 14.5% of the country’s IC demand.²¹ The inefficient supply is expected to get even worse in future years, as the explosive demand from China’s booming OEMs and contract manufacturers require volumes of semiconductors that even the growing number of new fabs will not be able to meet.

China’s foundries have also established close ties with the growing number of domestic and foreign-owned IC design companies. Richard Chang, president of Semiconductor Manufacturing International Corp. (SMIC), located in Shanghai, estimates there are more than 80 IC design houses in the Shanghai area alone. In fact, Chinese foundries are hoping to take a page from their competitors in Taiwan, which developed a successful formula by serving local IC designers. Chinese foundries have lined up large domestic customers, and their managers believe that the burgeoning ranks of Chinese-owned and foreign OEMs and contract manufacturers will expand the demand for 8-inch wafer lines.

In addition, the Chinese government recently tapped Shanghai Hua Hong NEC Electronics Corporation to supply custom EEPROM (Erasable Electric Programmable Read-Only Memory) chips for national identity smart cards that will be required of all Chinese citizens. The fab, which now uses only

19. S. Liu, “China Seeks to Challenge Taiwan Foundries,” *EE Times*, <<http://www.siliconstrategies.com/story/OEG200103S0023>>, January 3, 2001.

20. F. Hung, “Taiwan’s Government Lifts on China Fabs,” EBN, <<http://www.siliconstrategies.com/story/OEG20020329S00317>>, March 29, 2002

21. M. Clendenin, “Foundries Poised as Taiwan Nears OK on China Fab Investment,” *EE Times*, March 13, 2002, <<http://www.siliconstrategies.com/story/OEG20020313S00240>>.

half of its capacity for foundry work, will also supply ICs for a social security smart card for citizens in the Shanghai region.²²

The impact of China's rise in the electronics manufacturing industry is being felt in Taiwan. This is not PC case production, the type of low-end product that the mainland usually takes over from Taiwan. It is instead an industry that is within the sweet spot of Taiwan's electronics renown. In its drive to quickly develop a high-tech electronics manufacturing industry, China is determined to replicate every tool used by the Taiwanese, to learn from their successes, and avoid their few failures.

Even though Taiwan's TSMC and UMC do not view the Chinese foundries as near-term competitors, they are not discounting potential competition in the future. Making matters worse is the recent allegation that a former TSMC employee transferred sensitive plant schematics, and possibly process flow recipes, to SMIC, which is trying to lure Taiwanese engineers to China. SMIC has denied the report. TSMC, after an internal investigation, has filed suit against the person, who now works at SMIC.²³

Dilemma Faced by Taiwanese Government

Although Taiwan's semiconductor manufacturers show an interest in investing in China, they had been precluded by a five-year-old rule, the so-called "no haste, be patient" policy. The rule is a protectionist measure that curbs capital flight from Taiwan to China by capping individual investments at \$50 million and forbidding the manufacture of a host of IT goods, such as semiconductors.

Easing the ban on computer chips has not been easy for Taiwan, where the government still considers China its biggest security threat. Some business leaders are eager to set up factories in China to help them keep a competitive edge and take advantage of low production costs and the nearby Chinese market. But many others are concerned that easing the ban will weaken the island's already faltering economy and give China added political leverage over the island.

Taiwan's Council for Economic Planning and Development put forward "active opening, effective management" in the place of "no haste, be patient" policy in August 2001, sparking a heated debate on whether to lift the ban on 8-inch wafer manufacturing investment in China. The Taiwanese government has faced the dilemma of liberalizing its investment policy toward China while not sacrificing its own economy to boost that of its rival. By far,

22. T. K. Leng, "Economic Globalization and Its Talent Flows Across the Taiwan Strait: The Taipei/Shanghai/Silicon Valley Triangle," *Asian Survey* 42:2 (March/April 2002), pp. 230–50.

23. See Robertson, "Let Them Come."

this is the government's most-watched decision since it decided to open up high-tech-oriented exchanges with China.

Taiwan's government faces two choices: (1) to give semiconductor foundries the freedom to migrate to China, and risk losing their investment dollars at home; or (2) to suffocate them by barring entry to China, then watch as competitors swoop in and eat up the China pie, diminishing demand for Taiwanese fabs. Many of the island's influential entrepreneurs have urged the government to phase out the cap so IT firms can be more competitive. They have also predicted that many of Taiwan's high-end, high-value industries, such as the semiconductor industry, would keep their more advanced 12-inch wafer manufacturing at home for the short term because of the superior infrastructure in Taiwan and also owing to U.S. restrictions on exporting sub-0.25-micron semiconductor equipment to China. Fabs are most economical when they are gathered in clusters, as in the Hsinchu Park, where they can share engineering and services and attract circles of suppliers. Morris Chang said recently in a TV interview, "TSMC's policy is to keep its headquarters, R&D center, and manufacturing business in Taiwan, and to market around the world, except some special places such as China. China is a conservative market. We need to manufacture the wafers there to enter the market."

The opposition of the engineers' union adds another shade of complexity to an already intense debate. "We fear that if high-end companies like TSMC move [to China], there will be no expansion opportunities in Taiwan," Wen Hsu, vice president of the Taiwanese Professional Engineers Association, told Taipei's *Lianhe Bao*. "We will not have better jobs, or better pay. If we want that, then we will have to go to China. I want to stay here. My family is here."²⁴

To Hsu, the establishment of business in China by Taiwan foundries is a death stroke to the island's future. Over one weekend in mid-March of 2002, the engineers' group led nearly 1,000 people to protest the opening of investment, arguing that it will lead to more job losses. The island at that time was already suffering from a high, 5% unemployment rate.²⁵ "If we want to maintain our competitive position, we have to stay in Taiwan," Hsu told the newspaper. "If TSMC and UMC go there, then we lose that, inch by inch. . . . We have lost 6-inch [production facilities] already. We are going to lose 8-inch and then 12-inch. How much more can we lose?" It is estimated that 17,000 jobs will be lost by 2005, due to the migration of 8-inch wafer fabs to China.²⁶

24. *Lianhe Bao* (United Daily News), Taipei, March 6, 2001.

25. F. Hung, "Taiwan Government Postpones Decision on China Fabs," *EBN*, January 11, 2002, <<http://www.siliconstrategies.com/story/OEG20020111S0054>>.

26. *China Times*, March 19, 2002.

The unwillingness of some businesses to move away from home reflects the anticipation of tough times in mastering the shift to 12-inch (300 mm) wafers and their associated exotic technology. The move to bigger wafers is far from an easy task. First, plant conversion is impractical, if only because the new machinery needs higher ceilings. Next, the technical hurdles are pole-vault high. But conversion will be worth the effort. The potential economic advantages are even greater than those implied by the simple mathematical fact that this 50% increase in the diameter of a wafer results in an area 2.25 times as large.

“We still think Taiwan is in a very competitive position. We are capable, we own the technology, and we are cost-effective,” said Frank Huang, CEO of PowerChip Semiconductor. He added, “The China market is growing. Taiwanese companies can’t miss out on it—we have to be there. There’s no reason that the foundries should not be there. The ranking officers in the government all know that.”²⁷

The Decision-making Process in Lifting the Ban

The entire decision-making process for lifting the ban on semiconductor investment in China lasted for nine months, from August 2001 to April 2002 (see Table 1 for a summary of arguments, pro and con). Table 2 is a timeline, listing the milestone events for the process. Table 3 lists the major supporters and opponents.

One consensus reached at the EDAC was to allow Taiwanese enterprises to directly invest in China, so long as investment security can be ensured. This issue is still under debate, and has not become official policy yet. This was also the now-ruling DPP’s promise during Taiwan’s 2001 parliamentary election campaign. The proposal, from a party that historically has favored independence for Taiwan and eschewed close ties with the mainland, was seen by many as a measure to help boost the island’s battered economy. Strong opposition, however, came from certain quarters, led by the Taiwan Solidarity Union, one of Taiwan’s major political parties, and former President Lee Teng-Hui, raising concerns that the case might have been deferred indefinitely.²⁸

On the other hand, the Taiwanese government wanted to see that at a minimum, Taiwan maintained a five-year leading advantage in the semiconductor industry. Moreover, the government wanted to ensure that chipmakers would keep their R&D dollars at home. Local industrial analysts criticized this stance, saying that instead of trying to extract such promises, the government

27. *Ibid.*, March 19, 2002.

28. *Ibid.*, March 9, 2002.

TABLE 1 *Arguments Made by Supporters and Opponents*

<i>Arguments</i>	
Supporters	<ol style="list-style-type: none"> 1. Help upgrade local industries and raise Taiwan's competitive edge in the international semiconductor market 2. Demonstrate Taiwan's economic liberalization and consolidate the foundation for Taiwan's global logistics operations 3. Remain current with international trends and plan the development of their business with a global perspective 4. Increase the operating share of Taiwan's wafer manufacturing 5. Attract more foreign capital to Taiwan for more high-tech investment
Opponents	<ol style="list-style-type: none"> 1. The leading edge of Taiwan's high-tech sector may vanish 2. Capital flight from Taiwan to China 3. Core technology flow to China 4. National security concern about rival China 5. Further job losses in the coming years due to the move of manufacturing business 6. "Cluster effect" may show up by the move of semiconductor foundries, followed by packaging and testing companies, etc. 7. A potential negative impact on the semiconductor industry and domestic economy 8. Trigger another wave of industry moves to China

SOURCES: *China Time* and *United Daily News*, August 1, 2001–April 30, 2002.

should be thinking about the proactive steps it can take to persuade these companies to stay.

The impending manufacturing loss has had government officials and industry observers and insiders scrambling to find a way to ensure that Taiwan can remain a high-tech player. One of the biggest questions has been how well the Taiwanese, known for being "fast followers," would reposition themselves as leaders. The government has weighed in with a host of promises and initiatives, notably an increase in R&D spending by 10% annually until 2010, with the target set at 3% of the island's GDP. Taipei is also pushing to locate a third science park in the center of Taiwan and to promote its two software centers at Nankang and Kaohsiung.²⁹ With all these efforts, the Taiwanese government hopes that it can transform the island into a regional R&D hub for semiconductors, optic-electronics, telecommunications, and biotechnology, as well as a heaven for manufacture of high-end IT hardware products such as information appliances and slim notebook PCs.

The solution to these conflicting interests, as proposed by Premier Yu Shyi-kun in March 2002, was to "liberalize 'small-scale' and 'low-level' [IC

29. "White Paper on Science & Technology/ROC," Taiwan National Science Council, July 1997, <<http://www.nsc.gov.tw/>>.

TABLE 2. *Timetable of the Decision-making Process of Lifting the Ban*

Time	Decision making
August 2001	1. In the Council of Economic Planning and Development, the "active opening, effective management" policy was proposed in place of "no haste, be patient" toward cross-strait investment.
August 2001 to February 2002	1. There was a heated debate on whether to lift the ban of semiconductor investment in China. Business leaders were eager to set up factories in China, to help them keep a competitive edge and cut costs. But many others were concerned that easing the ban would weaken the island's already faltering economy and give China added political leverage over it.
Early March 2002	1. Mainland Affairs Council Director Ing-Wen Tsai reported to the Legislative Yuan that lifting the ban of wafer investment in China is like letting go of two tigers. "Once these two tigers eat up the rabbits in China, they will come back and eat the Taiwanese rabbits." 2. Taiwan Professor Association, Taiwan Engineers Association, and National Jobless-Labor Union had a press conference and proposed that wafer investment in China would be a death-stroke. They also held a demonstration on March 9. 3. Minister of Economic Affairs Tsai-Yi Tsong said that currently, 30% of wafer manufacturing facilities were not in use and did not hire any employees. Letting these manufacturing facilities go to China would not influence the job market of Taiwan. In addition, once it is open to invest in China, the government will have an appropriate mechanism to make sure the capital would flow back to this island. 4. TSU asked the opinion of Frank Huang, CEO of Powerchip Corp., about wafer investment in China. Huang proposed that lifting the ban would not influence the semiconductor manufacturing industries of Taiwan.
Mid-March 2002	1. Labor Council Chairwoman Ms. Chen cited a report from Industrial Technology Research Institute and said that if the 12-inch wafer plant cannot fill the vacancy left by the move of 8-inch wafer manufacturing to China, there will be an estimated 18,000 job losses by 2005. To accommodate, Chen added that her council will provide job training to promote the talents for high-tech IT industries.
Late-March 2002	1. Two public surveys were released showing that ratio of support to opposition for lifting the ban of wafer investment in China is about 50:50, with supporters slightly outnumbering opponents. More than 25% of the people being surveyed only supported lifting the ban subject to some conditions. The director of the Mainland Affairs Council, Ms. Tsai, frequently visited the Legislative Yuan, explaining the monitoring policy of wafer investment in China. She stressed that in order to keep the high-tech sector in Taiwan, she would not let go without any monitoring mechanism. 2. Premier Yu announced he would "liberalize 'small-scale' and 'low-level' (IC fabs) investments under the principle of effective management after the establishment of supportive measures."
	3. Meanwhile, the TSU proposed that the 8-inch wafer can only be allowed to move to China after 12-inch wafer manufacturing has been implemented to mass production. They also urged the government to punish those companies that broke the law and invested in China before the opening policy was announced. 4. Secretary-General of KMT's party in the Legislative Yuan Yi-Shih Lin proposed that the Executive Yuan should have a monitoring team to check investment affairs and report to the Legislative Yuan regularly.
Early April 2002	1. President Shui-Bian Chen said that instead of banning all semiconductor companies from investing in China, the government should lift the ban and effectively manage the investments by Taiwan's companies. 2. A new public survey showed 27% of those surveyed supported the decision of lifting the ban policy, 30% objected to the decision, and 33% did not know enough about the issue. In addition, 28% of the people think the open policy will help boost Taiwan's economy, 34% of the people said it would not, and 30% of the people did not know whether or not it would help. 3. The Executive Yuan tried to pass a law banning high-tech talent from going to China and being employed by Chinese companies. This proposal experienced strong objections from most of Taiwan's IT companies.

TABLE 3 *Who Supported and Who Opposed*

<i>Supported</i>	<i>Opposed</i>
1. President Shui-Bian Chen	1. Former President Teng-Hui Lee
2. Vice President Annette Liu	2. TSU Party
3. Former Minister of Economic Affairs Tsai-Yi Tsong	3. Taiwan Professor Association
4. TSMC President Morris Chang	4. Taiwan Engineers Association
5. National Science Council Sub-micron Lab Director Min Shih	5. Mainland Affairs Council Director Ing-Wen Tsai
6. Deputy Premier Hsin-Yi Lin	6. Former Director of Economy Development Council Bo-Chi Chen
7. President of the National Chiao-Tung University Chun-Yan Chang	

fabs] investments under the principle of effective management, after the establishment of supportive measures.”³⁰ Speaking at a news conference, Yu announced that the government would allow makers to produce chips etched on 8-inch (200 mm) semiconductor wafers in China—after they have begun producing more advanced 12-inch (300 mm) wafers in Taiwan. “With this policy . . . we hope to build Taiwan into the world’s manufacturing center of 12-inch wafers,” Yu said. Three 8-inch wafer fabs, mainly from the two major foundries, TSMC and UMC, will be allowed to move to China by 2005.

Chipmakers that intend to apply for mainland production must upgrade their technology in Taiwan and reach volume production in their 12-inch wafer plants, said the premier. Yu pointed out that with the additional capacity of 12-inch wafers, Taiwan should become home by 2005 to some eight new 12-inch (or equivalently, 20 8-inch) wafer fabs in addition to the 20 that exist now.

The holdup stems from national security and other non-economic officials, who want assurances that chip manufacturers, especially the foundries, won’t exit Taiwan after the door is cracked open. Since the plan being drawn up by the government will allow Taiwanese firms to relocate existing fabrication equipment, officials want to prevent an outflow of Taiwan-based chip-makers—and capital flight—to the mainland.

Taiwan’s electronics industry has praised the long-awaited rescission of a half-century ban on direct investment in China as an important gesture that could lead to long-term growth for the island’s struggling high-tech sector. “We welcome the government’s decision to allow such investment, but we do

30. S. K. Yu, Policy Statement on the Liberalization of Mainland-bound Investment in Silicon Wafer Plants, Government Information Office, Taipei, March 29, 2002, <<http://www.gio.gov.tw/taiwan-website/>>.

not have a timetable as to when we should go,” said TSMC’s Morris Chang in August 2002.³¹

As proposed by J. M. Buchanan, the 1986 Nobel economics laureate, “The science of political economy emerges to occupy a role that is perhaps more important than its predictive counterpart. In the ultimate sense, this science finds its normative purpose in *control*—that which is exercised upon our behavior by the selection of the institutional-constitutional constraints within which we interact one with another.”³² It appears that the Taiwanese government has finally come to understand which is the lesser of the two evils. Nevertheless, the lifting of restrictions on 8-inch wafer investment in China must be a matter within the context of economy from a professional point of view. Things should be run according to the law of nature.

Although the Taiwanese government had finally proposed a solution to the conflicting economic problem, was the problem really solved? Probably not. The foundry investment issue itself is not a problem. The real problem is the future consequences from what was left behind, since a purely economic issue was solved by political means. If the wafer investment case was resolved politically, what might be the next such issue?

Conclusion

For the past three decades, the Taiwanese government has been playing a leading and direct role in the institutional establishment and structure of Taiwan’s semiconductor industry. The government has faced a dilemma, however, of liberalizing rules for investment in China while not boosting the mainland economy at Taiwan’s own expense. Many business leaders are eager to set up factories in China to maintain a competitive edge and cut costs. But many others are concerned that easing the ban on semiconductor investment will weaken the island’s already faltering economy and give China added political leverage over the island. In March 2002, after much delay, the Taiwanese government finally came out with a “small-scale and effective management” solution designed to satisfy conflicting interests. The decision-making process was highly dependent on politics. The semiconductor investment problem may not have actually been solved, since a purely economic issue was resolved by political means. It is expected that the Taiwanese government will have to face more such dilemmas across the Taiwan Strait in the near future.

31. Lianhe Bao, August 30, 2002.

32. J. M. Buchanan, *Liberty, Market and State: Political Economy* (Brighton, Sussex, UK: Wheatsheaf Books 1986), pp. 28–39.