CHAPTER 10
FINANCING TAIWAN'S KNOWLEDGE-INTENSIVE FIRMS

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INTRODUCTION

The era of the knowledge economy has dawned and technological knowledge has already increased significantly over the last decade. At the start of the 21st century, the idea of the knowledge economy is widely adopted and it has become an important yardstick in the drive towards economic growth. The production inputs of labour, machinery, and land are no longer the sole motive power ensuring continuing economic development; now economic development must be founded on knowledge and information.

In 1980 Taiwan embarked on a process of industrial upgrading, which brought extremely rapid growth in the island's high-tech industry along with a steady increase in high-tech businesses' share of total production value. On 31 August 2000, the Administration Authority of the Executive Yuan approved the Knowledge Economy Development Project, which set out development strategies and measures for the drive towards the knowledge economy. Knowledge-intensive industries usually mean those industries that create value in products through innovation. They might be traditional or high-tech industries, although most knowledge-intensive industries are high-tech industries. The project of the Administration Authority demonstrates that continued promotion of the high-tech industry and technological upgrading would be vital aspects of future industrial development in Taiwan.

A number of environmental factors are prerequisites for effective development of the knowledge economy. One of the most important of these is a sound financial environment. Advanced economies have highly developed financial systems and a wide range of financial institutions and financial instruments and offer high-tech firms a variety of financing sources. In order to develop its high-tech knowledge-intensive industry Taiwan must not only promote

R&D for technological upgrading, but also ensure that enterprises similarly have access to suitable funding, whether they have become established businesses or are still in the planning stage.

The government provided financial as well as technical assistance to high-tech firms that located in the new Hsinchu Science-based Industrial Park (HSIP). The Development Fund allocated funds for low-interest loans to start-ups and investment in new companies through selected state banks, and the Industrial Technology Research Institute (ITRI) transferred technology developed by its various divisions to the HSIP companies. This extensive government support was a great help in establishing the high-tech firms in HSIP. But government financial support should not be the mainstay for high-tech industries once an economy has a well-developed industrial sector and financial system. Therefore, establishing a sound financial system is a major prerequisite to facilitating funding sources for knowledge-intensive firms in Taiwan.

High-tech industries often have a greater level of risk than other industries, particularly enterprises in the start-up phase, which need seed capital. Providers of seed capital take on this greater risk, but they also have the prospect of earning higher returns. Thus, the high-tech industry needs a financial environment in which those who wish to invest in high-risk/high-return start-up activities can do so easily. Taiwan needs some financial reform in order to achieve such a financial environment.

This chapter describes the ongoing development in the financing of high-tech firms in Taiwan. It begins with a general overview of the funding environment for knowledge-intensive firms. Then the chapter examines three major categories of non-government financing, evaluating their past role in supporting high-tech and start-up enterprises and the expected changes. The third section examines indirect versus direct financing, the fourth section discusses the contribution of the stock market, and the fifth section examines the growth and operation of venture capital businesses. The concluding section argues that Taiwan needs to concentrate particularly on filling the financing gap for enterprises in the earliest stages of

development.

THE FUNDING ENVIRONMENT FOR KNOWLEDGE-INTENSIVE FIRMS IN TAIWAN

Funding Requirements and Business Development

The financing needs of most enterprises, including high-tech ones, change as they develop from initial concept to established commercial operation. This study distinguishes six stages of business development—planning, establishment, mass production, expansion, maturity, and reorganisation. Other analyses of business development identify only four or even three stages. The exact number of stages is not important; the essential point is that enterprises need funding at all stages, and that their specific funding requirements change as the business develops.

An inventor or entrepreneur needs funds to turn a concept into reality and thus enterprises in the planning stage need seed capital. In the establishment stage, enterprises need to finance product development and marketing, and they need initial capitalisation. R&D expenditures account for a high percentage of their total funding requirements. Businesses in this stage inherently involve new products that carry a high level of risk. Because of this, newly established enterprises have difficulty securing loans from traditional financial institutions, such as banks, and they often depend on personal capital, government funding, and venture capital financing (whereby investors receive a share of the new company's equity in exchange for funding).

During the mass production and expansion stages, enterprises are developing their operations and expanding production capacity. They can obtain working capital to meet accounts receivable and increase inventories from commercial banks, but they may require additional funds to construct and expand factories as their sales grow. High-tech companies in the expansion stage may obtain medium-and long-term funding from development banks or from private sector financial institutions.

Once a high-tech firm has reached maturity, its operations have stabilized, and levels of

risk as well as profits have fallen. Hence, a firm at this stage can obtain most of the funding it needs from financial institutions such as commercial banks and bills finance companies. It can secure long-term capital by listing on the stock exchange or from the OTC market. Mature firms may need to reorganise and transform in order to survive and grow in the wake of a major change in the business environment. Normally, they can go to the banking sector and stock market to obtain the funds to do this, but in times of recession the government may provide financial and tax measures to facilitate mergers and acquisitions among established companies.

Funding Sources and High-tech Industry Development

Not only do funding requirements change with an enterprise's stage of development, but also certain types of funding are best provided by particular financial institutions (Table 10.1). Consequently, enterprises depend on funding from different elements of the financial system over the course of their development. Government typically provides funds in the early stage of business development, while commercial banks tend to become involved at a relatively late stage (with specialist banks involved slightly earlier). Although individual investors may provide funds at any stage, venture capital companies are involved in the early to middle stages, while the capital markets play no funding role until much later on.

TABLE 10.1
Funding Sources at Different Stages of Enterprise Development in Taiwan

Development Stage	Type of Funding Required	Source of Funds					
		Government	Commercial Banks	Special Banks	Capital Markets	Venture Capital Companies	Individual Investors
Planning	Seed capital	X					X
Establishment	Funding for establishment and early stages of operations	X		X		X	X
Mass production	Working capital and expansion funding	X	X	X		X	X
Expansion	Expansion funding		X	X		X	X
Maturity	Mature funding		X		X		X
Reorganisation	Reorganisation funding	X	X		X		X

Source: Compiled for this study.

In Taiwan, the government began to promote the high-tech industry in 1980. The Council for Economic Planning and Development's Ten-year Plan for Economic Construction singled out electronics and information along with machinery as industries of particular strategic importance. The government subsequently clarified the strategy and principles for the development of these strategic industries in the Plan for the Development of the Machinery Industry and the Plan for the Development of the Electronics Industry. In 1982, the Industrial Development Bureau collaborated with the Ministry of Finance, Chiao Tung Bank, and ITRI to encourage the development of strategic industries. Thereafter, in order to promote industrial upgrading, the government developed the concepts of Ten Emerging Industries, Important Technology Enterprises, Eight Key Technologies, and Sixty-six Key Components, and it provided funding and tax incentives to support the development of these industries and technologies.

The need for special government incentives to promote specific industries diminished as a result of the rapid growth in the high-tech sector and the steady improvement in the financial

system during the 1990s. The trend is moving toward allowing the internal market mechanism of the financial system to allocate funds for industrial development. Indeed, throughout the 1990s the government shifted steadily away from industry-specific incentives towards more function-specific incentives.

Private funding through financial institutions, the capital markets, and individuals can play a significant role in supporting the growth of the high-tech industry. The private financial system can provide loans or investment funds to finance both medium and long-term capital expenditures–to purchase land or establish production facilities–and it can provide shorter-term working capital to fund everyday purchases and sales activities. As Taiwan's financial system was liberalised during the 1990s, new types of financial institutions and instruments started to appear, including venture capital businesses and stock market peripheral institutions, expanding the content of financial services. However, financial institutions in Taiwan are still not as competitive in providing financial services to industries as are their counterparts in advanced countries. Taiwan must further improve the financial services available to knowledge-intensive firms.

INDIRECT AND DIRECT FINANCING AND SUPPORT OF HIGH-TECH INDUSTRY

Historically, the great majority of business financing in Taiwan has come through indirect finance (mostly financial intermediaries), rather than direct finance (i.e., the financial markets). In 1980, over 80 percent of non-government financing was indirect, specifically commercial bank loans (Table 10.2). The share of indirect financing declined gradually from the early 1990s as alternative sources of financing began to develop, but at the end of 2001, indirect finance still accounted for just under two-thirds of the funds provided by the non-government sector.

Thus, in Taiwan an industry's development prospects, and the prospects of the high-tech industry in particular, depend critically on access to indirect finance. Banks are the main

providers of indirect finance. The traditional industries, which were the main recipients of bank loans in the past, have grown weaker with the transformation in Taiwan’s industrial structure and the technology-intensive industries took their place as Taiwan's key industrial sector following the industrial upgrading of the 1980s. These now matured high-tech industries have easier access to both bank loans and direct finance, and government financial support is less important than before. For those high-tech companies that are just getting off the ground, though, obtaining loans from commercial banks is difficult because they lack collateral. Moreover, newly established high-tech firms find it difficult to secure direct financing because they lack a clear record of profitability and because Taiwan's capital markets are not functioning properly. Thus, the financial needs of start-up high-tech enterprises are not being served well by either traditional indirect financing or the developing capital markets.

TABLE 10.2
Direct and Indirect Financing by Non-government Sector, 1980-2001

	Indirect Finance		Direct Finance								Total	
	Loans		Subtotal		Listed Stocks		Sort-term Bills		Corporate Bonds			
	$NT 10 mil.	%	$NT 10 mil.	%	$NT 10 mil.	%	$NT 10 mil.	%	$NT 10 mil.	%	$NT 10 mil.	%
1980	10,008	83.37	1,996	16.63	1,087	9.05	659	5.49	250	2.08	12,003	100
1981	11,221	80.73	2,678	19.27	1,284	9.24	1,098	7.90	297	2.14	13,900	100
1982	13,051	80.31	3,199	19.69	1,515	9.32	1,333	8.20	351	2.16	16,250	100
1983	15,140	80.73	3,614	19.27	1,672	8.91	1,594	8.50	348	1.86	18,754	100
1984	17,028	79.89	4,287	20.11	1,904	8.93	1,959	9.19	424	1.99	21,315	100
1985	17,978	80.05	4,480	19.95	2,134	9.50	1,954	8.70	391	1.74	22,457	100
1986	19,653	81.64	4,420	18.36	2,408	10.00	1,545	6.42	466	1.94	24,073	100
1987	23,892	83.32	4,782	16.68	2,885	10.06	1,381	4.81	516	1.80	28,675	100
1988	33,030	86.00	5,377	14.00	3,563	9.28	1,293	3.37	521	1.36	38,406	100
1989	40,576	85.14	7,081	14.86	4,709	9.88	1,918	4.02	454	0.95	47,656	100
1990	46,434	83.34	9,280	16.66	5,293	9.50	3,471	6.23	516	0.93	55,714	100
1991	57,277	84.76	10,302	15.24	6,205	9.18	3,446	5.10	652	0.96	67,579	100
1992	72,309	85.74	12,027	14.26	7,400	8.77	3,961	4.70	666	0.79	84,336	100
1993	83,874	83.93	16,059	16.07	8,945	8.95	6,511	6.51	604	0.60	99,933	100
1994	96,735	83.73	18,802	16.27	10,809	9.36	7,286	6.31	707	0.61	115,537	100
1995	104,641	80.64	25,115	19.36	14,976	11.54	9,217	7.10	922	0.71	129,756	100
1996	106,951	75.30	35,076	24.70	18,935	13.33	13,636	9.60	2,504	1.76	142,026	100
1997	119,407	73.04	44,074	26.96	26,558	16.25	14,284	8.74	3,232	1.98	163,481	100
1998	125,323	68.19	58,454	31.81	35,248	19.18	18,017	9.80	5,189	2.82	183,777	100
1999	129,774	67.88	61,405	32.12	40,458	21.16	15,045	7.87	5,901	3.09	191,179	100
2000	135,445	66.48	68,302	33.52	48,564	23.84	12,665	6.22	7,073	3.47	203,747	100
2001	129,310	64.26	71,928	35.74	52,636	26.16	11,103	5.52	8,189	4.07	201,238	100

Note: Loans, listed stock and corporate bonds are outstanding (market) values.
Source: Compiled from Central Bank data.

A financial sector that offers a multi-functional mix of services will create a better environment for business funding. In order to support the development of knowledge-intensive firms, the financial system in Taiwan must offer a wider variety of both direct and indirect financing options. Toward this end, in 2001 the government approved the establishment of financial holding companies (FHC) in Taiwan. Thirteen new FHCs were established up to September 2002. A single FHC may own several different financial institutions including commercial banks, industrial banks, securities companies, insurance companies, venture capital businesses, and financial consulting agencies. At the same time, Taiwan also needs a healthy financial supervisory agency to oversee the activities of the financial system.

THE STOCK MARKET AND HIGH-TECH INDUSTRIES

The stock market in Taiwan is significantly larger than the bond market and it is the main source of direct financing for all companies. In 2001 the value of listed stocks was over six times the value of corporate bonds outstanding (Table 10.2). Moreover, the bond market is not a significant source of funding for newly established knowledge-intensive firms because it caters to larger firms.

Taiwan has two stock markets, the Taiwan Stock Exchange (TSE) and the Over-the-Counter Securities Exchange (OTC). The TSE listed 584 companies with total capitalisation of NT$4.1 trillion in December 2001 and the exchange's total trading volume that year stood at NT$18.4 trillion (Table 10.3). The OTC listed 333 companies with a total capitalisation of NT$0.68 trillion in December 2001 and it had a total trading volume of NT$2.3 trillion. In general, in order to be listed on the TSE companies must meet certain standards, including minimum years of establishment and profitability. Listing on the TSE is more difficult than on the OTC, mainly because the TSE requires minimum paid-in capital of NT$300 million compared to only NT$100 million for the OTC. Most SMEs, which dominate Taiwan's industrial structure, lack the liquidity and economies of scale to list on either the TSE or OTC. Hence, SMEs usually cannot use capital market funds to expand their scale of production or improve competitiveness.

TABLE 10.3
Characteristics of Taiwan's Stock Markets, 1995-2002

	Taiwan Stock Exchange			ROC OTC Securities Exchange			Unlisted Companies	
	No. of Listed Companies	Capitalisation NT$ billion	Trading Volume NT$ billion	No. of Listed Companies	Capitalisation NT$ billion	Trading Volume NT$ billion	No. of Companies	Capitalisation NT$ billion
1995	347	1,347	10,152	41	173	3	999	1,218
1996	382	1,661	12,908	79	264	454	1,110	1,346
1997	404	2,106	37,241	114	315	2,311	1,501	1,462
1998	437	2,734	29,619	176	381	1,198	1,801	1,519
1999	462	3,086	29,292	228	514	1,900	2,018	1,610
2000	531	3,661	30,527	300	677	4,480	2,257	1,519
2001	584	4,096	18,355	333	681	2,329	1953	1,518
2002 Jan.-Mar.	595	4,081	7,332	380	702	1,081	1,607	1,184
				Growth Rate (%)				
1995	10.86	22.53	-46.04	192.86	1,666.85	392.25	8.94	1.11
1996	10.09	23.36	27.15	92.68	52.67	16,119.92	11.11	10.45
1997	5.76	26.79	188.52	44.30	19.22	409.51	35.23	8.66
1998	8.17	29.81	-20.47	54.39	21.44	-48.15	19.99	3.88
1999	5.72	12.76	-1.11	29.55	34.62	58.57	12.05	5.98
2000	14.94	18.75	4.22	31.58	31.46	135.79	11.84	-5.65
2001	9.98	11.88	-39.87	11.00	0.59	-48.01	13.47	-0.07

Source: Taiwan Stock Exchange; ROC Over-the-Counter Securities Exchange; Securities and Futures Commission and http://www.sfc.gov.tw

Both the TSE and the OTC have special listing standards intended to help high-tech start-ups secure direct funding by selling shares in the capital market, however. Such provisions include eliminating restrictions on years of establishment or profitability and lowering the minimum paid-in capital requirement. The OTC also has a Second Category for companies that have been in existence for at least one year with no accumulated losses but low capitalisation. In terms of the dispersion of equity, the TSE requires high-tech companies to have a minimum of 1,000 registered shareholders, at least 500 of whom must each hold between 1,000 and 50,000 shares. The OTC requires at least 300 shareholders each with between 1,000 and 50,000 shares, and with their combined holdings accounting for at least 10 percent of the company's total equity, or at least 5 million shares. Given its less rigorous financial requirements, the OTC requires a company to be recommended by at least two securities firms, whereas the TSE requires recommendation by only one.

Despite the relaxed listing requirements for high-tech firms on both exchanges, most high-tech firms choose to apply for listing as an ordinary company. A company that applies under the high-tech provisions must submit evidence from the government agency

supervising its industry stating that (i) it is a high-tech company; and (ii) its product or technology development has been successful and it has marketable products or technologies. The Industrial Development Bureau (IDB) has formulated a set of guidelines for requesting such government support, but very few companies have applied for listing in accordance with those guidelines. This is mainly because most high-tech companies that apply for TSE or OTC listing can already meet the requirements for ordinary companies, so there is no need for them to apply as high-tech companies.

Investors in Taiwan's stock markets appear to prefer non-traditional over traditional industries, making it easier for high-tech companies to obtain capital market funding. In 2001, over 80 percent of the value of the shares of manufacturing firms listed on the TSE was attributable to companies in non-traditional manufacturing industries, which are mainly related to the high-tech sector. For companies listed on the OTC it was 95 percent (Table 10.4). Traditional industries, on the other hand, accounted for just 18 percent of the value of manufacturing shares on the TSE and for a mere 4 percent of the OTC. Most traditional industries are now declining industries, although they continue to generate about 60 percent of manufacturing output by value (Table 10.5).

TABLE 10.4
Value of TSE- and OTC-Listed Manufacturing Companies by Traditional and Non-traditional Industries, 1999-2001

	1999		2000		2001	
	NT$ million	%	NT$ million	%	NT$ million	%
TSE-listed manufacturing companies	8,986,189	100.00	6,194,553	100.00	5,404,444	100.00
Traditional industries	2,313,294	25.74	1,461,796	23.59	993,967	18.39
Non-traditional industries	6,672,895	74.26	4,732,757	76.41	4,410,477	81.61
OTC-listed manufacturing companies	1,052,939	100.00	576,709	100.00	507,449	100.00
Traditional industries	65,716	6.24	25,998	4.50	20,803	4.10
Non-traditional industries	987,223	93.76	550,711	95.50	486,646	95.90

Notes: Figures for 2001 cover January to October only. Traditional industries include food and beverages, textiles and garments, leather and fur products, wood and bamboo furniture, papermaking and printing, chemical materials and products, rubber and plastic products, petroleum, non-metal mineral products, basic metals, metal products and other manufacturing. Non-traditional industries include machinery, electricity and information, electronics and vehicle manufacturing.
Source: Complied from data supplied by the Taiwan Stock Exchange.

TABLE 10.5
Value of Manufacturing Output by Traditional and Non-traditional Industries, 1999 and 2000

	1999		2000	
	NT$ million	%	NT$ million	%
All manufacturing	2,470,012	100.00	2,549,927	100.00
Traditional industries	1,502,653	60.84	1,511,238	59.26
Non-traditional industries	967,359	39.16	1,038,689	40.74

Notes: Traditional industries include food and beverages, textiles and garments, leather and fur products, wood and bamboo furniture, papermaking and printing, chemical materials and products, rubber and plastic products, petroleum, non-metal mineral products, basic metals, metal products and other manufacturing. Non-traditional industries include machinery, electricity & information, electronics and vehicle manufacturing.
Source: Complied from data published by the Council for Economic Planning and Development.

High-tech companies can gain access to direct finance by listing on one of the stock exchanges, but what about unlisted companies? Many unlisted companies have made initial public offerings (IPOs). Investors are eager to buy such stocks just before they list, in order to enjoy the post-listing 'honeymoon' period during which prices typically rise rapidly. Trading in unlisted shares is unregulated in Taiwan, however. As a result disclosure by issuing companies is not controlled, the transaction process is not transparent, and investors' rights are not fully protected.

In an attempt to address these problems and strengthen the capital markets, the OTC is currently nurturing a market for unlisted shares, which it established in January 2002. The registration requirements for this new market are very loose. For example, a company simply needs to be recommended in writing by a minimum of two securities firms that do meet the listing requirements. How this market develops remains to be seen, but it should facilitate financing for promising high-tech start-ups.

VENTURE CAPITAL FINANCING AND TAIWAN'S HIGH-TECH INDUSTRIES

Venture capital financing developed rapidly in Taiwan during the 1990s, growing considerably faster than in most other countries. Taiwan ranked eleventh in total volume of venture capital investment in 1999 and third in terms of the average rate of growth of venture capital investment from 1995 to 1999 (Tables 10.6 and 10.7).

TABLE 10.6
Top 20 Countries by Amount of Venture Capital Investment, 1999

Rank	Country	Amount US$ billion	Rank	Country	Amount US$ billion
1	United States	97.6	11	Taiwan	0.9
2	England	12.3	12	Japan	0.8
3	Germany	3.4	13	Spain	0.8
4	France	3.0	14	Belgium	0.7
5	Italy	1.9	15	South Korea	0.5
6	Canada	1.8	16	Switzerland	0.5
7	Netherlands	1.8	17	Singapore	0.4
8	Sweden	1.4	18	South Africa	0.4
9	Hong Kong	1.3	19	Australia	0.3
10	Israel	1.0	20	Norway	0.3

Source: PriceWaterhouseCoopers.

TABLE 10.7
Top Countries, by Average Growth Rate of Venture Capital Investment for 1995-99

Rank	Country	Growth rate %	Rank	Country	Growth rate %
1	Sweden	201	10	England	39
2	Switzerland	119	11	Netherlands	32
3	Taiwan	60	12	France	30
4	Italy	59	13	Singapore	28
5	Belgium	58	14	Norway	25
6	Israel	54	15	Canada	24
7	Germany	42	16	Hong Kong	13
8	Spain	41	17	South Korea	4
9	United States	40			

Source: PriceWaterhouseCoopers.

The venture capital industry in Taiwan traces its origins to the November 1983 promulgation of the Regulations Governing Venture Capital Business Management. The industry developed slowly until the early 1990s despite government tax incentives for venture capital companies in 1984, the introduction of the Development Fund in 1985, and Chiao Tung Bank's investment in venture capital companies in 1991. Fewer than four new venture capital companies were established each year from 1984 to 1994, except for 1989 and 1990. Significant returns on past venture capital investments did not materialise until 1996, when the high-tech industry recorded strong growth and high-tech stock prices began to soar. Thereafter, the number of venture capital companies began to grow significantly. By the end of 2000, Taiwan had 184 venture capital companies with total capital of NT$128 billion and of these companies, 157 were established after 1996.

Industry growth was particularly strong with the run-up in high-tech stock prices in 1999

but it slowed since then. Forty-six new firms with a total capitalisation of almost NT$30.5 billion were started in 1999, but only 31 new companies with capitalization of NT$24.7 billion appeared in 2000, and a mere seven new venture capital companies were established in 2001. Moreover, only 176 of the 199 licensed companies in 2001 were actually operating. The remaining 23 had either yet to begin operations or had postponed their establishment, suggesting that venture capital companies were having difficulty raising initial funding.

The emergence of a venture capital industry in Taiwan provided strong financial support for the island's growing high-tech sector during the 1990s. Cumulative venture capital investment totalled NT$125.5 billion at the end of 2000. Virtually all (97 percent) of this amount was invested in high-tech industries, with less than three percent going to traditional industries, and almost three-fourths (73.7 percent) remained in Taiwan, with the rest going mainly to Silicon Valley and other parts of the United States (Table 10.8). By industry, venture capital funding concentrated in the semiconductor (18.4 percent of cumulative investment), information (17.6 percent), electronics (14.5 percent), communications (12.3 percent), and opto-electronics (9.8 percent) industries. By stage of business development, 45.3 percent of venture capital funding went to firms already in the expansion stage while less than one-third went to earlier stages of development—7.9 was invested as seed capital and 23.8 percent went to enterprises in the establishment stage.

Nevertheless, the role of venture capital in the early funding of enterprises in Taiwan did increase significantly during the 1990s. The proportion of total venture capital funds invested in seed capital and establishment stages rose from 14.2 percent in 1994 to 40.6 percent in 2000 and the proportion of projects in these two stages increased from 17 percent to 37 percent (Table 10.9). Almost one-third of the total venture capital investment in these two stages from 1984 to 2000 (NT$39.9 billion) occurred in the single year 2000. The increased availability of venture financing for new businesses was limited to firms in the establishment stage, however. By 2000, the share of venture capital investment, by number of projects as well as amount of financing, going to establishment stage firms had risen to over 30 percent, but the share going to nascent businesses as seed capital showed no discernible trend. Thus,

there still appears to be a need to generate financial support for enterprises in the earliest stage of development.

TABLE10. 8
Venture Capital Investment by Industry and Stage of Development, Cumulative through 2000
(NT$ million)

	Industry Total		Industry Amount by Stage of Development				
	Amount	**%**	**Seed Capital**	**Establishment**	**Expansion**	**Maturity**	**Reorganisation**
Information	22,079.5	17.59	1,966.1	4,114.9	9,555. 4	6,191.0	252.1
Software	7,775.8	6.20	472.7	2,555.4	3,395.7	1,319.1	33.0
Internet	3,523.8	2.81	220.5	1,794. 1	1,044.8	437.4	27.1
Electronics	18,180.7	14.49	524.3	2,894.3	10,213.9	4,112.7	435.5
Semiconductors	23,144.8	18.44	1,905.0	5,696.9	10,264.3	5,196.6	81.9
Communications	15,387.6	12.26	1,759.5	3,936.3	7,045.3	2,426.5	220.0
High-end sensors	452.4	0.36	41.1	65.9	294.5	50.9	-
Pollution prevention	258.0	0.21	39.0	103.6	66.7	48.8	-
Precision machinery and automation	3,028. 8	2.41	86.2	189.2	1,459.0	1,289. 5	-
High-end materials	1,371.3	1.09	14.0	432.5	539.2	382.5	3.0
Special chemical products and pharmaceuticals	399.9	0.32	40.1	136. 8	223.0	-	-
Medical and healthcare	821.1	0.65	21.4	319.6	374.5	105.6	-
Aerospace	485.9	0.39	-	41.2	339.6	57.9	47.2
Resource development	645. 1	0.51	-	352.5	235.2	57.3	-
Opto-electronics	12,300.3	9.80	1,121.2	4,643.1	4,555.8	1,953.2	27.0
Biotechnology	3,571.2	2.85	452.2	1,067.7	1,197.7	833.6	20.0
Technical services	604.0	0.48	38.8	172.4	296.7	96.2	-
Other key technologies	4,202.2	3.35	222.6	404.3	2,794.1	752.2	29.0
Venture capital companies	2,216. 1	1.77	916.7	663.3	576.5	59.5	-
Traditional, low-tech industries	5,065.0	4.04	109.8	339.2	2,402.6	2,167.8	46.0
Venture capital total	125,508.3	100.0	9,951.2	29,923.3	56,874.2	27,538.4	1,221.4
Stage share of venture capital for all industries			7.93%	23.84%	45.32%	21.94%	0.97%

Source: Lin C-F. and Y-J. Ch'en. 2001. Suggestions Regarding the System for Transactions in Unlisted Shares in Taiwan, *Securities Transaction Data*, No. 471.

TABLE 10.9
Venture Capital Investment in the Early Stages of Enterprise Development, 1994-2000

	Seed Capital		Establishment Stage		Early Stages Subtotal	
	Investment Amount					
	NT$ millions	% Share	NT$ millions	% Share	NT$ millions	% Share
1994	133.0	3.80	363.0	10.40	496.0	14.20
1995	471.0	8.00	785.0	13.30	1,256.0	21.30
1996	889.0	10.10	1,569.0	17.80	2,458.0	27.90
1997	725.0	4.13	4,227.0	24.07	4,952.0	28.20
1998	2,013.1	9.32	5,450.4	25.24	7,463.6	34.56
1999	1,850.8	6.25	7,435.4	25.13	9,286.1	31.38
2000	2,406.4	7.81	10,109.8	32.82	12,516.2	40.63
	Projects					
	Number	% Share	Number	% Share	Number	% Share
1994	17	7.80	21	9.60	38	17.40
1995	31	8.50	21	15.10	52	23.60
1996	57	12.10	91	19.30	148	31.40
1997	49	5.15	203	21.35	252	26.50
1998	123	10.65	280	24.24	403	34.89
1999	120	8.01	361	24.08	481	32.09
2000	125	6.76	562	30.38	687	37.14

Note: % share denotes the percentage of the total for all stages, although the table shows only the two earliest stages.
Source: Lin C-F. and Y-J. Ch'en (2001), 'Suggestions Regarding the System for Transactions in Unlisted Shares in Taiwan' (in Chinese), *Securities Transaction Data*, No. 471.

Moreover, the recent slowdown in the venture capital industry may adversely affect the financing of high-tech businesses. One explanation for the slowdown is the phase-out of the 20-percent tax offset for investment in venture capital firms scheduled for 2000. This policy change does appear to have led certain investor groups to withdraw from venture capital business. From 1999 to 2000 the share of venture capital funds from all domestic corporate persons fell by 3.9 points, while the share from individual domestic investors increased slightly (Table 10.10). Among the various categories of corporate persons, the shares of most financial corporations increased, but the share of venture capital investment from high-tech companies was down 3.9 points and the share from ordinary non-financial companies was down 1.8 points. Hence, it appears that the abolition of the tax incentives may indeed have induced some high-tech and other non-financial corporations to decrease their investment in venture capital firms. The ultimate impact on the funding of high-tech firms may not be significant, however, because these same sophisticated investors are very likely to be attracted to invest directly in high-tech start-ups in order to continue to enjoy tax breaks.

TABLE 10.10
Composition of Venture Capital Funds by Source
(Percentage of total)

	1998	1999	2000
All corporate persons	**80.7**	**78.6**	**78.5**
Domestic	75.8	74.9	71.0
Foreign	5.2	3.7	7.5
Government agencies	2.5	1.7	1.7
State banks	0.8	0.7	0.4
Private banks (domestic)	4.6	4.6	5.0
Foreign banks	0.7	0.6	0.6
Insurance companies			
Domestic	5.8	7.0	8.7
Foreign	0.6	0.4	0.5
Pension funds			
Domestic	0.0	0.0	0.0
Foreign	0.0	0.0	0.0
Investment institutions			
Domestic	12.3	12.3	12.6
Foreign	3.3	2.5	6.1
Securities firms			
Domestic	0.6	0.0	0.0
Foreign	0.1	0.1	0.1
Non-financial corporate persons	49.5	48.5	42.8
Ordinary companies		34.8	33.0
High-tech companies		13.7	9.8
All individual investors	**19.0**	**20.2**	**20.6**
Domestic	18.9	20.1	20.6
Foreign	0.1	0.1	0.1
Other	**0.2**	**1.1**	**0.9**
Total	**100.0**	**100.0**	**100.0**

Sources: Survey of the Venture Capital Industry (1998–2000); *Venture Capital Investment Gazette* No. 21, 22, 23; Venture Capital Association of the ROC.

The slowdown in the growth of the venture capital business in Taiwan can also be linked to increasing global competition and the emerging global trend toward mergers and acquisitions. Companies in Taiwan are gradually making use of acquisitions, strategic alliances, and cross-investment to secure key technologies and increase their own competitiveness. These activities might lead companies and institutional investors to invest directly on their own rather than indirectly through venture capital companies**.**

The importance of venture capital in the development of knowledge-intensive companies is finally gaining official recognition. In 2001, the government Development Fund launched a project aimed at injecting partial funds directly into venture capital investment. It will be some time before the influence of this particular project on industrial development becomes evident, but the program is intended to stimulate high-tech industry investment through the growth of venture capital companies.

Access to venture capital should continue to improve, moreover, as the expected trend to establish financial holding companies (FHCs) takes hold in the financial sector. These new financial institutions will provide a comprehensive range of financial services, and one of these should be venture capital financing. Of the FHCs that have been established so far, however, few have venture capital subsidiaries. This suggests that there is room for further diversification of the financial products offered by Taiwan's financial sector.

CONCLUSION

Since the 1980s, industry upgrading performed well in Taiwan. The information services and electronics industries enjoyed the most rapid growth. On the other hand, biotechnology and pharmaceuticals, which is another 'hot' sector, did not experience similar vigorous growth in new enterprises. This industry may lag in new enterprises because it is in the early stages of development when investment risk is regarded as extremely high. In order to develop a knowledge-intensive economy, it is important for all knowledge-intensive industries to have access to loans. An ideal financial system should provide fluent channels for funds to companies during each stage of development. How to imbue Taiwan's financial system with this capacity has been an important issue.

The financing structures of industries change gradually. In recent years the previously unimportant direct finance channel, especially the stock market, attracted more funds for high-tech companies. Equity financing is expected to become nearly as important as debt financing.

The role of the government should just fill the gap when the market mechanism of the private financial system cannot meet industries' funding needs. The government provided some financial support for strategic, high-tech industries, but it should not be taken as a long-term measure. Stock market investors showed a strong preference for listed firms in high-tech industries over traditional ones, and venture capital businesses burgeoned along with the rapidly growing economy and soaring stock prices. Nevertheless, Taiwan continues to need to direct more investment funding to the early stages of enterprise development, rather than in

the later stages. For example, potential business angels, i.e., those with adequate funds, need to organise themselves and exchange information about investment opportunities, in order to provide further funds to knowledge-intensive firms. The government should establish itself as a channel between demanders of funds and suppliers of funds

The knowledge economy and technological progress sparked a transformation in the world's industrial structure, encouraging new business formation and stimulating the development of the venture capital industry. Taiwan's high-tech industries have performed well so far, but the sustained growth of knowledge-intensive firms will depend on improving many aspects of the financial system.

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