

# Enhancing Innovation Finance

*Inderbir Singh Dhingra*

Accessing finance for innovation is a challenge, even in economies with well-developed financial markets. Although access to finance does not pose as big a challenge for large and even medium firms, it is a severe constraint for smaller enterprises, start-ups, and innovative grassroots projects. Access to finance for innovation is an important link in the innovation cycle—covering innovation costs, supporting incubation, and financing commercialization—making innovation sustainable and rewarding. Around the world, constraints in financing innovative enterprises include the following:

- Actual and perceived risks arising from the higher failure rates of innovative micro, small, and medium enterprises (MSMEs), and unproven products and business models
- Lack of management and operational capabilities among technopreneurs and scarce mentoring resources
- Information asymmetries—given that entrepreneurs and innovators are more comfortable with innovation than are financiers, partly because of lack of technical expertise among financiers
- High transaction costs of dealing with start-ups and MSMEs given the small size of seed and early-stage investment relative to investment efforts (due diligence) and the time required in hand-holding and mentoring start-up management teams.
- Difficulties in attracting experienced investment professionals as fund managers in seed and early-stage funds as a result of the long gestation period for returns on such investment and the lower remuneration—the 2.0–2.5 percent management fee from managing small funds (\$10 million–\$30 million) is less than that from managing larger, later-stage, and private equity funds.

- Lack of reliable, adequate track records and financial information (adverse selection challenge).
- Lack of adequate collateral and the intangible nature of the assets of the enterprises.
- Institutional and legal factors, including competition-related distortions and inefficiencies in the banking sector, an underdeveloped legal system and enforcement, and inadequate information infrastructure.<sup>1</sup>

These constraints are also present in India, which has a well-developed public and private equity market relative to most other emerging markets.<sup>2</sup>

Government funding has played an important role in India's early-stage technology development (ESTD), but has not achieved the desired scale and quality of research and development (R&D) investment and commercialization. As discussed in earlier chapters, there is considerable scope for strengthening India's performance in knowledge creation and commercialization, raising R&D, increasing the effectiveness of public R&D, and deepening interactions among R&D labs, universities, and the private sector by, among other things, restructuring or scaling up grant-based initiatives. Furthermore, new initiatives are needed to stimulate knowledge creation (see chapter 2).

Although venture capital and private equity have been expanding in India in recent years, funding of seed and early-stage finance remains a key challenge. In 2005, early-stage funding accounted for just 13 percent of the deals by the venture capital and private equity industry. In dollar terms, early-stage deals account for 4–6 percent of investment by the venture capital and private equity industry.<sup>3</sup> Despite a significant number of major funds being created in India in the past 12–18 months, there remains a bias toward larger funds, information technology (IT), and proven business models. New efforts in seed and angel funding that are trying to fill the gap still have insufficient capital to meet the needs of early-stage finance.

The supply of early-stage venture capital could be increased by creating incentives for domestic liquidity from wealthy individuals and allowing insurance and pension funds to provide early-stage venture capital. In addition, a fund of funds could be created to spur public-private venture capital funds, with the goal of attracting private capital and international and domestic expertise and fund management experience in early-stage venture capital. Finally, to address the demand side for the venture capital industry, the flow of deals must be enhanced through multipronged reforms to improve the overall innovation climate as well as the governance, incentives, and design of India's innovation system, as discussed in previous chapters. This involves restructuring and enhancing public support for ESTD and incentives for R&D commercialization in labs and universities—promoting a culture of entrepreneurship and social support, providing complementary infrastructure and an enabling environment for innovation and entrepreneurship, and improving the overall investment climate for firms.

The magnitude of the financing gap for technology absorption by MSMEs is unknown, but the constraints facing MSMEs in financing new investments suggest

its significance. Credit to Indian micro and small enterprises (MSEs), which includes financing for upgrading technology, fell as a share of net bank credit between 2003 and 2006. Government schemes to spur technology financing for MSEs, such as the Credit Linked Capital Subsidy Scheme for upgrading technology in small-scale industries, have also not allocated enough capital to support knowledge absorption by firms. Enterprise surveys suggest that funding for absorption of innovative practices is more constrained for smaller enterprises and traditional industries. Measures to improve access to finance for MSMEs would improve access to finance for innovative MSMEs wishing to upgrade technology. Possible government actions include providing matching grants for technology absorption as well as addressing constraints to MSME finance—including improving credit information on MSMEs, strengthening collateral and mortgage registries, reforming the bankruptcy framework, and facilitating leasing.

### Financial Support for Early-Stage Technology Development

The higher risks associated with seed capital for ESTD result in fewer sources of private funding. The literature cites two key reasons the market for funding ESTD,<sup>4</sup> and even early-stage business operations, may not be efficient—making the case for public intervention.<sup>5</sup> The first is the partial appropriability of returns from investment in R&D—due to positive spillovers—which does not allow original inventors or investors to capture all the benefits of their inventions and innovations. This results in lower spending on ESTD than would be socially optimal. The second reason is information asymmetry, arising from the gap between the information available to inventors and investors. Most investors are poorly equipped to quantify the risks and technical and market uncertainties associated with most inventions. Moreover, the due diligence required to close this information gap discourages investors (angel investors, venture capitalists), who prefer to wait to see the business case for a new technology at least partly demonstrated before investing.

The role of government and angel investors is more important in ESTD. Informal sources and grant-based government programs play a larger role in ESTD funding, injecting capital into a company's product concept stage—when the idea is being conceptualized. ESTD funding can continue to the seed stages of a company's development. In the United States, for example, federal and state governments provide 23–30 percent of ESTD finance, while angel investors contribute 24–27 percent. Venture capital contributes only 3–8 percent.<sup>6</sup> In India, government programs have played a larger role in funding early-stage finance than have angel investors and university-funded incubators. Formal groups of angel investors, such as the Band of Angels, have been created only recently. University-funded incubators have played an important role in giving initial support, but venture capital is not always available through these incubators. Moreover, many of these incubators are not adequately funded and lack facilities to support a large number of entrepreneurs. Government support for ESTD has mainly been in the form of grants, soft loans, and government-funded incubators.

The main government programs have varied in their goals—from promoting high-technology ventures, as with the New Millennium Indian Technology Leadership Initiative (NMITLI) (though not funding start-ups), to funding indigenous technology, as with the Technology Development Board (TDB). Although these programs have targeted early-stage funding, some seem not to have been managed well, and the funds have not been used (see chapter 2).

Although data are lacking on the demand for early-stage financing in India, the vibrant innovation environment signals high potential for entrepreneurial activity (Dossani and Desai 2006). A growing number of graduates, the boom in IT and IT-related sectors, and the rise in business-savvy young professionals with the potential to create spin-off ventures create a rich entrepreneurial environment in India. The risk in ignoring the financing needs of these potential entrepreneurs at the conceptualization and proof-of-concept stage is that the economy loses by allowing only a small portion of its entrepreneurs to achieve their potential. As discussed in chapter 2 and shown in figure 7.1, a number of government programs target ESTD finance.

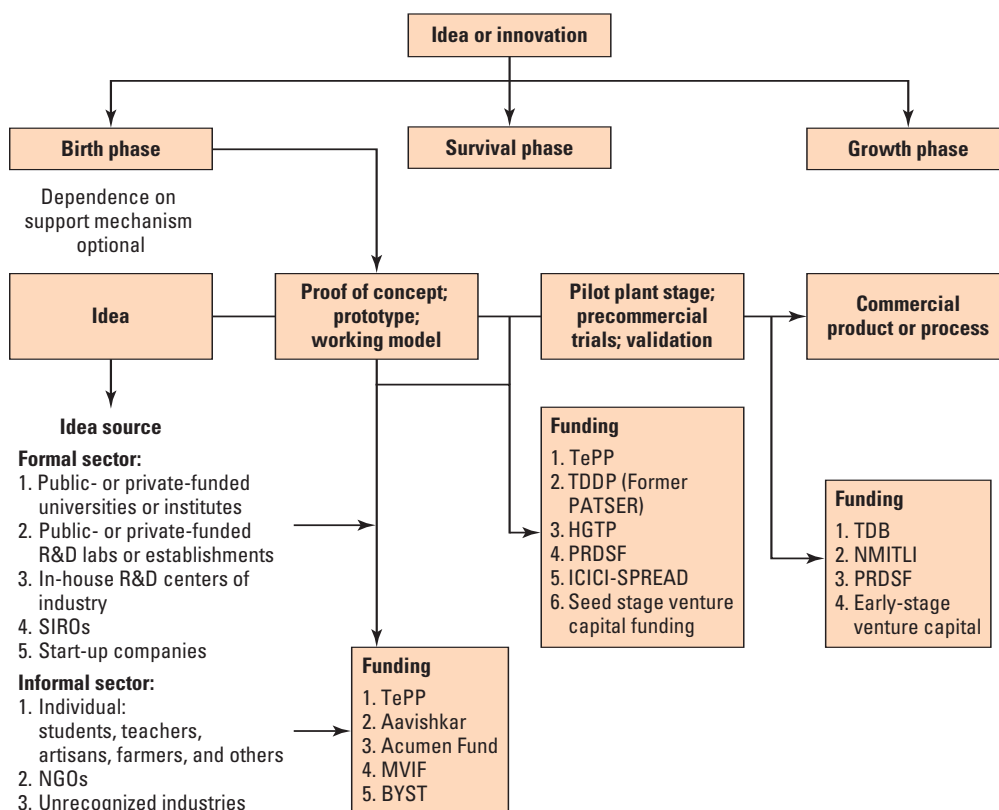
ESTD efforts are not creating a sufficient level and quality of demand for the venture capital industry. As discussed in earlier chapters, anecdotal evidence and indicators of India's performance in knowledge creation and commercialization through R&D are poor. Low overall R&D, dominance of public R&D, limited interaction between R&D labs, universities, and productive sectors of the economy—all point to a need to restructure and scale up grant-based initiatives.

### Recommendations for Improving ESTD Financing

The various ESTD financing schemes were discussed in chapter 2, and three recommendations based on that analysis are summarized here.

1. *An independent evaluation of government programs is needed.* The first step in correcting the mismatch between the need to promote entrepreneurial ventures and the shortage of capital in ESTD is to assess government spending on ESTD programs, with a view to improving governance, correcting design flaws, and addressing funding gaps:
  - The evaluation should review the roles, goals, governance structures, costs, performance, outcomes, and impacts of such programs.
  - The programs, including government-supported business incubators, should be assessed to gain a broad understanding of which sectors of ESTD the government currently finances and the impacts and returns of this financing.
  - Based on these reviews, changes should be made in the programs—including their expansion, consolidation, and closing, as appropriate.
2. *Efforts should be made to create new initiatives and build on existing programs.* As recommended in chapter 2, efforts should be made to develop initiatives that

Figure 7.1 Mapping of Early-Stage Finance in India



Source: World Bank; adapted from UN ESCAP (2005).

Note: BYST = Bharatiya Yuva Shakti Trust; HGTP = Home Grown Technology Program; ICICI = ICICI Bank; MVIF = Micro Venture Innovation Fund; NGOs = nongovernmental organizations; NMITLI = New Millennium Indian Technology Leadership Initiative; PATSER = Programme Aimed at Technological Self-Reliance; PRDSF = Pharmaceutical Research and Development Support Fund; SIROs = scientific and industrial research organizations; TDDP = Technology Development and Demonstration Program; and TePP = Techno-entrepreneurs Promotion Program.

stimulate knowledge creation, building on successful programs and expanding and consolidating where appropriate. As discussed earlier in this book, many government support programs have overlapping roles and goals. Program resources are fragmented, and most programs are operated by government bodies with little private sector participation in their management and operations.

- Particular attention needs to be paid to improving and scaling up existing ESTD funding mechanisms for grassroots innovation projects based on the evaluation. These mechanisms include efforts by the Council of Scientific and Industrial Research (CSIR) to demonstrate and pilot grassroots technology and provide R&D and grant funding to support prototype development and piloting for grassroots innovators through the Grassroots Innovation Augmentation Network (GIAN) and National Innovation Fund (as discussed in chapter 4).

## Early-Stage Venture Capital

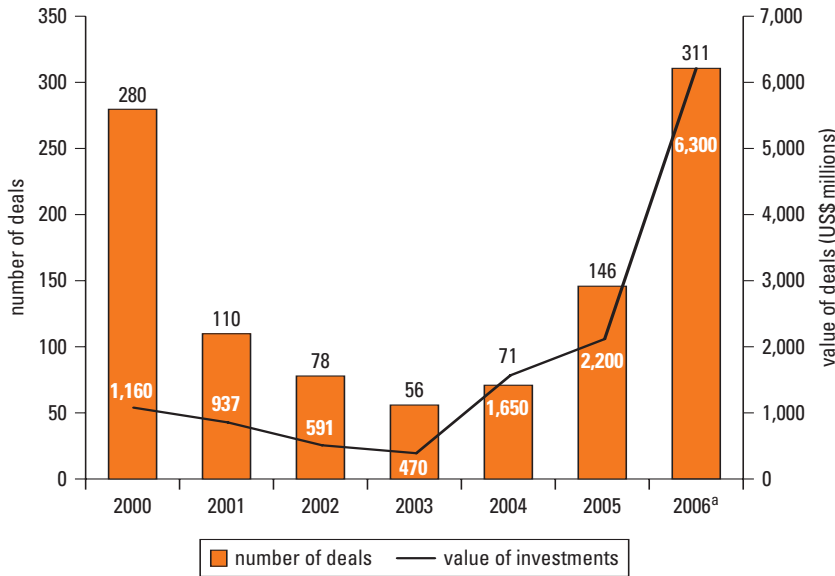
Venture capital plays a crucial role from an economic standpoint and is important to commercialization of R&D. Start-ups and MSMEs funded by venture capital tend to be the more innovative firms in an economy, contributing to economic productivity. Venture capital and angel investor financing is accompanied by management support, advice, reputation, and other forms of mentoring critical to business success. Despite contributing less early-stage funding than other sources—such as government and angel investors—in the United States (as well as Israel and Taiwan, China), venture capital has been associated with higher patenting, a larger share in industrial innovation relative to its share in R&D, and an overall increase in innovation (Kortum and Lerner 2000; Avnimelech and Teubal 2005a; Saxenian 2001, 2005). Around the world, venture capital has also been recognized for advancing the information and communication technology (ICT) revolution, enabling countries to catch up with international peers, deepening R&D, and facilitating the transition to knowledge and learning economies (Avnimelech and Teubal 2005b).

The challenge is in attracting venture capital at the seed and early stages of business. Venture capitalists want to maximize financial returns for their investors. They do not fund R&D, and prefer to support firms that have moved beyond the product development stage and to proven technologies and business models (Auerswald and Branscomb 2003). Still, venture capital firms are crucial for supporting early-stage financing—and with the right incentives and efforts to cut the costs of information asymmetries, can play an important role in seed and early-stage finance for innovative firms.

Venture capital and private equity activities have expanded in India in recent years. There has been great interest in investing in India in the past few years, from both domestic and international venture capitalists. The number of venture capital (including early-stage) and private equity funds being created by seasoned domestic fund managers has expanded significantly in the past 12–18 months. The interest of international (especially Silicon Valley) venture capitalists has also increased, with many creating India-dedicated funds and allocating more resources to exploring deals in India. In 2005, venture capital and private equity investment was \$2.2 billion—almost twice the amount in 2004 (figure 7.2). Furthermore, the number of deals and rounds of financing rose from 71 in 2004 to 146 in 2005, and is expected to more than double again in 2006.

Still, funding of seed and early-stage deals remains a key challenge. Despite the increase in funding from the venture capital and private equity industries, in 2005 early-stage funding deals accounted for just 13 percent of all deals by these industries and 4–6 percent of their investments (figure 7.3). Still, the average size of deals has grown in India—from \$8 million in 2002 to \$15 million in 2005. However, early-stage funding (especially seed and series A and B capital<sup>7</sup>) has not recovered from the burst of the market bubble in 2000, having suffered the most in 2000–03 and remaining negligible in 2004–05, despite a significant increase in investments and

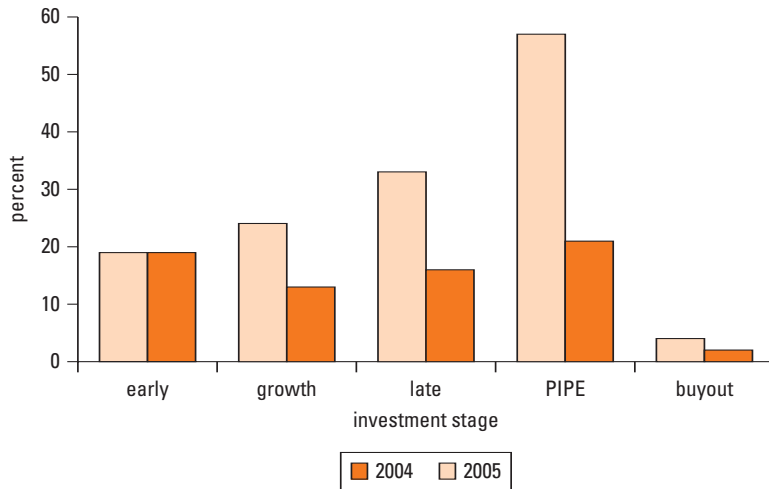
Figure 7.2 Venture Capital and Private Equity Deals in India, 2000–06



Source: Evalueserve Inc., India Venture Capital Association, and Venture Intelligence India.

a. Estimates by Evalueserve.

Figure 7.3 Distribution of Venture Capital and Private Equity Deals by Investment Stage in India, 2004–05



Sources: Venture Intelligence; TSJ Media.

Note: Early-stage deals are first and second rounds of institutional funding for companies less than 5 years old and not part of a larger business group. Growth-stage deals are third and fourth rounds of funding or first and second rounds of institutional investments for companies more than 5 years old or floated by large business groups and less than 10 years old. Late-stage deals are for companies more than 10 years old or pre-IPO (initial public offering) deals. PIPE (private investment in public equity) deals are investments in listed companies through a preferential allotment or private placement of shares, warrant, or both.

**Table 7.1 Number of Early-Stage Deals in India, 2000–05**

Type	2000	2001	2002	2003	2004	2005
Seed	74	14	7	5	6	5
Series A and B	68	22	9	8	23	14

Source: Venture Intelligence, TSJ Media, and Evalueserve Inc.

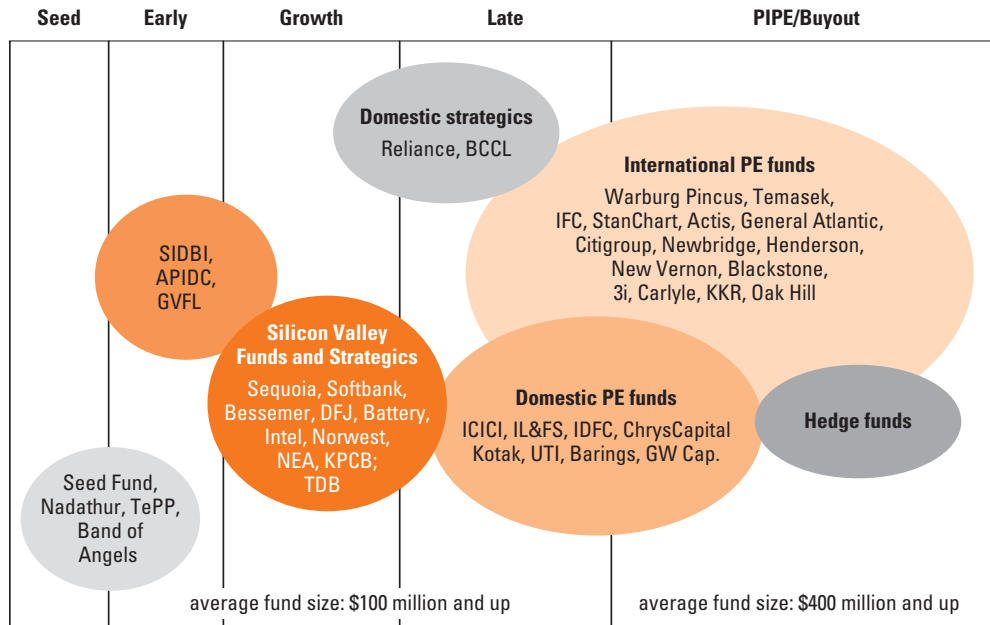
deals in other venture capital and private equity categories (table 7.1). Most growth has been in the mid-market segment of the venture capital industry (under \$10 million). The challenge is greatest for start-ups requiring investments of less than \$2 million–\$3 million, especially investments in the seed-stage range of \$0.5 million–\$1.0 million.<sup>8</sup>

Venture capital biases have resulted in disproportionate funding for certain early-stage ventures. The bias toward later-stage ventures often results in “overfunding” of start-ups by venture capital firms reluctant to do smaller transactions—an approach that is not always in the interests of efficiency and discipline of the start-ups. Another key feature of the venture capital–private equity scenario is the bias toward funding IT and IT-enabled service companies, which received 61 percent of the funding from the venture capital–private equity industry in 2005 (though there was more sectoral diversification in 2006). Most of these resources and efforts are directed toward early-to-growth-stage start-ups and those with cross-border business models (either addressing the international—especially U.S.—market or U.S. firms planning to off-shore operations or R&D in India).

Despite the significant number of major “India dedicated” funds raised in the past 12–18 months, there remains a bias toward larger funds, IT, and proven business models. Silicon Valley venture capitalists interested in India are inclined to take minimum exposures in the \$10 million–\$15 million range to justify the transaction costs associated with doing deals. Some, such as Bessemer Ventures, have drastically shifted their business models for India, taking equity exposures in large private equity transactions in non-IT firms instead of the Silicon Valley model of being early-stage technology investors. Even “early-stage” funds such as Helion Venture Partners prefer cross-border business models. The government-supported venture capitalists created in the early 1990s—the Small Industries Development Bank of India (SIDBI), Gujarat Venture Finance Ltd. (GVFL), and Andhra Pradesh Industrial Development Corporation (APIDC)<sup>9</sup>—along with Westbridge-Sequoia, remain the only major players for \$0.5 million–\$3.0 million investments (figure 7.4).

New efforts in seed and angel funding (Seed Fund, Band of Angels, Nadathur Holdings) trying to fill the gap have insufficient capital. Funds are also being provided (mostly in the form of grants) to some leading technology incubators by the Department of Science and Technology (see chapter 2). Estimates by the Seed Fund indicate that existing money for seed financing in India, including from government-sponsored funds and private sector efforts, is much less than is required.<sup>10</sup> Total cumulative start-up capital available in this segment is \$25 million–\$35 million—enough to help 75–100 start-ups get off the ground. But available series A and B

**Figure 7.4 India's Venture Capital and Private Equity Landscape: Skewed toward Larger and Later-Investment-Stage Deals**



Sources: Venture Intelligence; World Bank.

Note: Those companies not listed here are known exclusively by their acronyms. APIDC = Andhra Pradesh Industrial Development Corporation; BCCL = Bennett Coleman & Co.; DFJ = Draper Fisher Jurvetson; GVFL = Gujarat Venture Finance Ltd; IFC = International Finance Corporation; IL&FS = Infrastructure Leasing & Financial Services; KKR = Kohlbert Kravis Roberts & Co.; KPCB = Kleiner, Perkins, Caulfield, and Byers; NEA = New Enterprise Associates; PIPE = private investment in public equity; SIDBI = Small Industries Development Bank of India; TDB = Technology Development Board; TePP = Techno-entrepreneurs Promotion Program; UTI = UTI Ventures.

capital exceeds \$1 billion, which could be absorbed by 150–200 companies. For the series A and B capital to be used well (assuming, optimistically, that one in three early-stage funded start-ups graduates to the next stage), there need to be 450–600 start-ups that the early-stage funding community finances today—and that does not account for future growth. Hence, from a purely supply-side perspective, the total funding available at the early stage—especially in the range below \$2 million—is a bottleneck. Another possible manifestation of this issue is that R&D commercialization is very low, as are spin-offs from public and private R&D labs and universities. This represents a challenge as well as an opportunity.

The growth of early-stage financing for start-ups and innovative MSMEs is constrained by both supply and demand factors, pointing to the need for a realignment of expectations and business models in the venture capital industry targeting India. On the one hand, entrepreneurs complain about the lack of early-stage financing. On the other hand, venture capital–private equity activity had been expected to almost triple in 2006 relative to 2005.<sup>11</sup> In addition, the number of Silicon Valley funds coming to India and those being created specifically for India has shot up in the past

12–18 months. Venture capital fund managers complain about the lack of deal flows and idea generation. This is arguably the result of different expectations on both sides.

Most Silicon Valley and other new venture capital funds planning to invest in India are based on expectations of a pool of a U.S- or Israeli-type start-up base—with international business models, product companies, and the like. Furthermore, they seem to want to invest in sectors that they are more comfortable with—IT, telecommunications, and Internet products and services. Much of the entrepreneur base coming out of India may be predicated on a domestic market, consumer-based model, from first-time entrepreneurs with experience in service businesses and not necessarily the intellectual property–led product model that Silicon Valley venture capitalists are used to. Moreover, the levels of evolution and sophistication of these entrepreneurs are unlikely to meet the expectations of Silicon Valley venture capitalists (Evalueserve 2006). Finally, as noted, the deal-size filter of the new entrants still would not address the seed and series A and B needs of Indian entrepreneurs. A realignment of expectations and business models in India's venture capital industry is highly likely in the coming years.

On the supply side, a more rapid scaling up of early-stage financing would be facilitated by addressing the following issues:

- *Lack of adequate, relevant expertise among venture capitalists* and perceived unattractiveness of the effort required relative to the returns in investing in early-stage companies—which explains the inclination of India's venture capital–private equity industry to invest in later-stage companies needing growth capital or early-stage businesses adopting variants of demonstrated business models. In addition, the domestic and foreign financial sector and nonresident Indian dominance of venture capital have led to a venture capital–private equity industry that shies away from riskier, more innovative, and business-building venture capital and favors less labor-intensive, less risky, and more finance- and business-restructuring, later-stage investment. The larger share of private equity transactions is a manifestation, at least in part, of this phenomenon.
- *Difficulty in attracting experienced professionals in seed and early-stage fund management.* Three problems exist here: first, the significant effort and cost involved in continual hand-holding and mentoring management of a start-up; second, the long gestation period for returns in seed and early-stage investment relative to late-stage and private equity investment; and third, the lower remuneration arising from the fact that the 2.0–2.5 percent management fee from managing small funds (\$10 million–\$30 million) is less than that from managing larger, later-stage, and private equity funds.
- *Inability to channel domestic market liquidity into early-stage funding.* The negligible funding from wealthy individuals and the virtual absence of funding from pension and insurance funds have deprived the industry of stable, long-term sources of capital available in more developed markets. Restrictive investment guidelines constrain the ability of pension and insurance funds to

invest in venture capital. Venture capital funding was once classified as mandated lending for banks, but no longer. Moreover, the Reserve Bank of India has increased the risk weighting for venture capital funding for banks. The tax treatment and absence of incentives for venture capital relative to other asset classes—especially public equity, debt, and real estate—has made venture capital unattractive to rich people.

- *Inadequate legal, regulatory, and tax environment* (see Dossani and Desai 2006). India's policy and regulatory environment for venture capital can generally be considered pro-investor and has been improving, moving toward international best practice. Although the legal, regulatory, and tax environment has not been a binding constraint in attracting large and medium funds, bureaucratic hurdles need to be eased for domestic and foreign venture capitalists looking to operate in India—particularly for smaller, niche funds. For example, rules need to be clearer about the taxation of ventures, investors, and funds, as do the implications for the legal and institutional structures of venture capital firms. In addition, there are multiple regulations and little harmonization of guidelines across government agencies (Securities and Exchange Board of India, Reserve Bank of India, Central Board of Direct Taxes, Ministry of Company Affairs). There are also sectoral and security restrictions on investments by venture capitalists. Finally, investor rights are unclear as well.

On the demand side, the early-stage venture capital environment would be more attractive if the following issues were addressed:

- *A limited number of deals are bankable.* India has been relatively unsuccessful in nurturing a culture of entrepreneurship—especially of start-ups spinning off from R&D labs, education institutions, and large corporations. In 2003, the number of registered firms in India grew by 4.4 percent, compared with 8.6 percent in China, 9.7 percent in Ireland, 19.4 percent in the United Kingdom, and 23.4 percent in Germany (Klapper and others 2006). This may be due to a variety of factors, such as the incentives for public R&D and education institutions (as discussed in previous chapters), the lack of a social safety net, sociocultural attitudes toward failure, and the legal framework for business entry, operations, and exit.<sup>12</sup> In addition, the gap in precommercial financing and ESTD—typically supported by public institutions to spur R&D investment—results in too few spin-offs; in India such funding could come from the venture capital industry. Moreover, financiers often complain about the limited number of “big” ideas with the potential to provide returns as high as 200–500 percent, to satisfy portfolio diversification criteria.
- *Although Indian entrepreneurs typically possess technical and domain expertise on par with their Western counterparts, they lack skills in marketing, sales, business development, and financial planning and processes.* With such skills, the expected effects of venture capital in nurturing early-stage business would be much higher. The lack of such skills discourages venture capitalists from investing in very

early-stage businesses headed by inexperienced entrepreneurs with new business models, but also presents a chicken-and-egg situation—whereby the venture capital industry itself lacks sufficient personnel with operating experience that could nurture “raw” investments.

- *The risk perception associated with start-ups and MSMEs is higher in India due to investment climate bottlenecks.* Surveys by the World Bank and others point to the difficulties facing Indian firms relative to those in developed and other emerging markets. These difficulties stem from three issues. The first is the lack of adequate, reliable infrastructure. The second is the burden of business regulations, which result in significant management time being spent dealing with government regulations. And the third is the cumbersome legal system, which makes contract enforcement and business exit tedious, expensive, and time-consuming.<sup>13</sup> In addition, corporate governance and financial transparency standards are lower in Indian firms than in more developed markets, further increasing the risk perception of deals.

### **Recommendations for Improving Early-Stage Venture Capital Financing**

Governments can increase the supply of venture capital by investing public funds in these companies or by making it more attractive for nongovernment sources to do so. Investors seek to generate the highest risk-adjusted returns on their capital. In many countries they believe that the potential returns from venture investments do not justify the risks. Thus, government support programs that seek to encourage private investment must either enhance potential returns or increase the supply of funds to early-stage projects. Specific interventions include direct participation, or “seeding” of venture funds; tax credits, as a direct offset of a share of investors’ capital investment; government loans or loan guarantees to licensed venture funds; leveraged equity participation by government in private equity funds to increase the potential returns to private investors; and partial guarantees against losses for investors in venture funds—only up to certain levels, to ensure that investors take sufficient risks themselves.

First, the supply of early-stage venture capital can be increased by extending incentives for providing domestic liquidity to the industry. Changes in tax, Securities and Exchange Board of India, and insurance and pension fund guidelines could attract domestic investment in early-stage venture capital by doing the following:

- *Making it more attractive for wealthy individuals to invest in venture capital funds.* Fiscal incentives could encourage wealthy individuals—including those with domain knowledge and an appetite for risk—to plug the gap in angel investment. Investments in eligible funds and ventures could be given tax credits. In addition, the Securities and Exchange Board of India could permit “accredited” wealthy individuals’ investments in eligible venture capital funds to enjoy the same tax benefits (tax pass-through) available to registered funds under current regulations. This could provide a useful way to connect domestic and foreign angel investors to Indian start-ups, especially because the costly and complex

**Box 7.1 International Experience with Funds of Funds to Spur Public-Private Venture Capital Funds**

The more successful government support programs for venture capital funds have been those structured as public-private partnerships where the government is a financial backer—not a manager—of the fund. Responsibility for investment decision making rests with the private partner. The government provides capital (often providing leveraged returns to the private partner) and maintains oversight. Around the world, such public-private models have essentially been variants of the U.S. Small Business Investment Company (SBIC), created in 1959 to attract fund managers (from industry or with previous venture capital experience) who could bring domain expertise to the venture capital industry. The private manager (partner) raises capital commitments independently, supported by the government through equity contributions to the venture capital fund twice the private partner's contribution. The government also provides soft loans, enhancing private returns.

Israel's highly successful Yozma program aimed primarily to attract foreign domain expertise. The government contributed 40 percent of the financing for a foreign venture capital fund, with the rest coming from the fund. The returns to the foreign fund were enhanced by giving the option of buying out the government stake at a predetermined rate within five years. Other models, like Australia's Innovation Investment Fund and the U.K. Enterprise Capital Fund, have followed similar principles.

Source: Author.

procedures for establishing a venture capital fund in India deter individuals. Eligible funds and start-ups would be strictly defined to ensure support only to funds that invest in truly early-stage ventures (as defined by the size of the fund and maximum investment size, and restricted to the first or second rounds of external funding received by the firms).

- *Relaxing investment guidelines for pension and insurance funds* to allow them to increase their investments in venture capital funds, within prudential norms. Again, eligible funds could be defined to ensure that financing is directed toward early-stage businesses.<sup>14</sup>

Second, a fund of funds should be created to spur public-private venture capital funds targeted at early-stage investing. Learning from similar interventions elsewhere (box 7.1) and factoring in India's governance and administrative realities, a fund of funds could be created to attract private capital and professionals—with foreign or domestic domain knowledge and management experience—in a series of (“drop-down”) public-private venture capital funds by increasing potential returns or reducing potential risks. The investment restrictions of the program could support the government's development goals (say, by investing only in specified, eligible start-ups). The ultimate objective of the government support program would be for a

successful drop-down fund to subsequently raise funds based on its record, without government support, to be free of regulation. By supporting the first fund, therefore, the government would facilitate much more private capital for venture investments in the future. Considerations in designing the fund of funds include the following:

- *The government provides leveraged returns to private investors in drop-down funds.* To form the base of venture investment funds, private fund managers (experienced individuals, institutions, or both) would secure investment commitments from unrelated private sources. The government would provide a certain amount and limit its share of the profits to a certain interest rate plus a certain share of cash distributions from the funds. The remaining profits would be paid to the private investors and fund managers, increasing (or leveraging) their returns. These enhanced returns would make venture capital funds attractive investments for private investors and individuals with domain expertise and mentoring skills.
- *Government support (or a separate window of government support) could be used to reduce risk for risk-averse investors such as Indian institutions.* In this case, private investors would put up all the money for venture capital funds by purchasing units that are, as an illustration, one-third equity and two-thirds 10-year debt. The government would guarantee repayment of any debt not repaid from cash distributions from the fund. Because accrued interest will normally be greater than investors' equity investment, investors would know that, at the very worst, they will recover the full cost of their investment. At best, investors will realize the high returns that the funds expect to earn.
- *The extent and nature of government contributions would need to vary depending on the segment being targeted.* For example, to fund industrial start-ups, the government could provide equity contributions with leveraged upside to private investors, as mentioned in the first option. In addition, this fund of funds could have separate windows, with different investment terms, for creating funds—such as seed funds, early-stage funds, sector-specific funds (biotech, for instance), grassroots innovations, and MSMEs. For rural industry funds or pro-poor and grassroots innovations, government contributions could be in the form of low-cost loans. Expected returns for these funds would be lower than for traditional venture capital funds. In addition, the government may need to provide grants to defray staffing and due diligence costs, especially for seed stage and pro-poor innovation funds, to attract talent with investment and operational experience who can add value through intensive mentoring to rural and grassroots entrepreneurs.
- *It is critical that administration of the fund of funds be professional, free of bureaucratic burdens, and independent of political interference.* Hence, a small, independent institution could be created. Administration of the fund of funds could conceivably be a joint venture between the government and the private sector. The two main functions of the administrative body would be to select fund managers and funds to be supported, and to monitor the program once under way. The fund of funds could initially be created by consolidating some existing

government schemes administered by the Technology Development Board (TDB), Technology Information Forecasting and Assessment Council (TIFAC), and Department of Scientific and Industrial Research (DSIR)—with individual venture funds to be majority-owned and managed by the private sector.

Support for pro-poor innovation will likely require a higher grant element, because the business model for “commercial” capital to support grassroots innovations is still evolving.<sup>15</sup> Still, principles of professional venture capital and equity investment should be institutionalized even in venture capital funds that support grassroots innovations. Government contributions could be a mix of grants and soft equity. The grants could defray staffing and due diligence costs, since attracting the right kind of management and due diligence experience for grassroots investment is even more difficult than for early-stage investing in the formal sector (as mentioned above). The soft equity could provide leveraged returns to private partners while trying to demonstrate a viable business model. Aavishkar and Acumen Fund are pioneering efforts that could shape the design of support programs for grassroots innovations. For example, Acumen Fund is targeting at least a return on capital invested, and Aavishkar is targeting a positive internal rate of return (though not as high as in traditional venture capital). “Social venture capital” may need to use a different mix of instruments than is ordinarily used—for example, a small equity investment with disproportionate voting rights in certain cases combined with conditional, sales- and royalty-based loans.

There are examples in India of venture capital funds with partial public equity contributions, being managed by private managers—such as the Gujarat Venture Finance Ltd. (GVFL) and Andhra Pradesh Industrial Development Corporation (APIDC) venture capital funds. Moreover, the collaboration between APIDC and TDB involves TDB co-investing with the APIDC fund and being entitled to “soft” returns, while APIDC investors profit from any upside potential from the investments. Lessons from these and other experiences of government support to venture capital in India over the past two decades would need to be incorporated in the design of the fund of funds.

On the demand side, it is crucial that any intervention supporting venture capital be preceded or complemented by interventions addressing the ESTD funding gap. Thus, for a venture capital instrument to work effectively, there must be a pipeline or deal flow of companies with commercial potential. A venture capital program is therefore likely to work best where support for R&D through a grants program provides critical funding at early stages to advance companies to the level that they can be supported by venture capital firms. Venture capital measures should also be coupled with reforms that improve conditions for developing a venture capital industry, including revisions to venture capital legislation and capital market reforms that increase stock market liquidity. Countries with some of the most robust venture capital industries—the United States, Israel, Canada, Australia—have active programs at all stages of the innovation life cycle, from grants through venture capital support programs. For example, Australia’s R&D Start program provides grants for commercializing innovations by MSMEs and is complemented by its Innovation Funds program, which encourages venture capital investment in innovative MSMEs (World Bank 2006b).

Improving deal flow requires multipronged reforms to improve the overall innovation climate as well as the governance, incentives, and design of India's innovation system, as discussed in previous chapters. Recommendations for increasing the quality and quantity of deal flow for the venture capital industry include the following:

- *Increasing the scale and scope of public support for business R&D and incentives for research and commercialization.* As noted in chapters 2 and 4 and in the preceding section on ESTD finance, this involves improving governance and scaling up or restructuring existing R&D grant schemes. It also requires, where relevant, introducing cooperative and horizontal R&D grant elements in these schemes. Equally important are incentives for R&D labs and universities that encourage commercialization of R&D and industry linkages. These can be achieved through legislation similar to the U.S. Bayh-Dole Act, which provided incentives for universities to invest in research (see chapter 2), and the U.S. Stevenson-Wydler Act, which encouraged the transfer of technology from labs to industry through cooperative research. Such legislation is not necessarily aimed at addressing binding constraints, but is intended more as a signaling tool to encourage R&D commercialization.
- *Fostering an entrepreneurial culture and social support.* This involves promoting social norms encouraging entrepreneurship—especially becoming more forgiving of failure and placing a high social value on commercial success. The literature on innovation and entrepreneurship worldwide emphasizes tough bankruptcy laws and procedures as key impediments to greater entry of firms (and hence start-ups) and competition. A more entrepreneurial culture could be achieved by conducting media campaigns (for example, highlighting the success of first-generation entrepreneurs in IT and manufacturing), promoting innovation and entrepreneurship awards, and creating entrepreneurship funds and technology spin-off funds (for spin-offs from corporations, R&D labs, and universities).
- *Developing complementary infrastructure and an enabling environment for innovation and entrepreneurship*—such as technology incubators, science and technology parks, university linkages, and business development services (see chapter 2).
- *Improving the investment climate and the enabling environment for business entry, operations, and exit* (see chapter 1). Needed are entrepreneur-friendly policies that encourage competition from new entrants, bankruptcy laws that permit quick recovery, and a strong intellectual property regime that creates incentives for invention and encourages research and diffusion.

### Finance for Technology Absorption by Small and Medium Enterprises

Although no official data exist on the size of the finance gap facing MSMEs wishing to upgrade technology, constraints facing MSMEs in financing new investments suggest that it is large. In India, financing the adoption of innovation by MSMEs is as

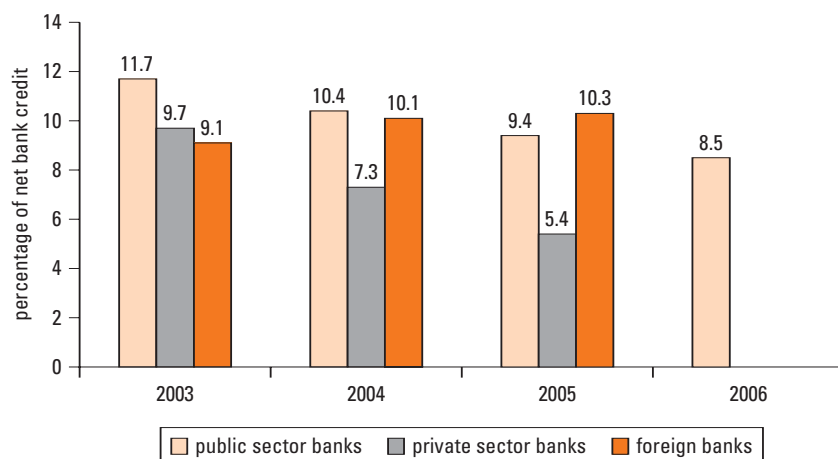
important as early-stage finance for new firms. This is especially so given this sector's importance in the overall economy and the significant differences in productivity between large firms and MSMEs across and within sectors (see previous chapters).

Access to adequate, timely finance on competitive terms has been identified by World Bank and Indian government analyses as a problem for MSMEs across the country.<sup>16</sup> Problems in accessing credit are due to a combination of factors:

- Weaknesses in the legal framework for loan recovery, bankruptcy, and contract enforcement, together with inefficiencies in the court system—with the latter largely accounting for interstate variations in the time and cost of loan recovery and bankruptcy.
- Institutional weaknesses, such as the absence of good credit appraisal and risk management and monitoring tools in banks—increasing their transaction costs when dealing with MSMEs.
- Absence of reliable credit information on MSMEs.
- Lack of sufficient market credibility in the MSME sector. It is hard for lenders to assess risk premiums, creating differences in the perceived and real risk profiles of MSMEs and resulting in untapped lending opportunities for them.

Financing for MSEs has been insufficient, including for upgrading technology. Credit to micro and small enterprises (MSEs), including financing for upgrading technology, fell as a share of net bank credit between 2003 and 2006 (figure 7.5).<sup>17</sup> Government efforts to spur technology financing for MSEs, such as the Credit Linked Capital Subsidy Scheme (CLCSS) for upgrading technology in small-scale industries (SSIs), have also not allocated sufficient capital to this important area. The

**Figure 7.5 Credit Flows to Micro and Small Enterprises, End-March 2003–06**



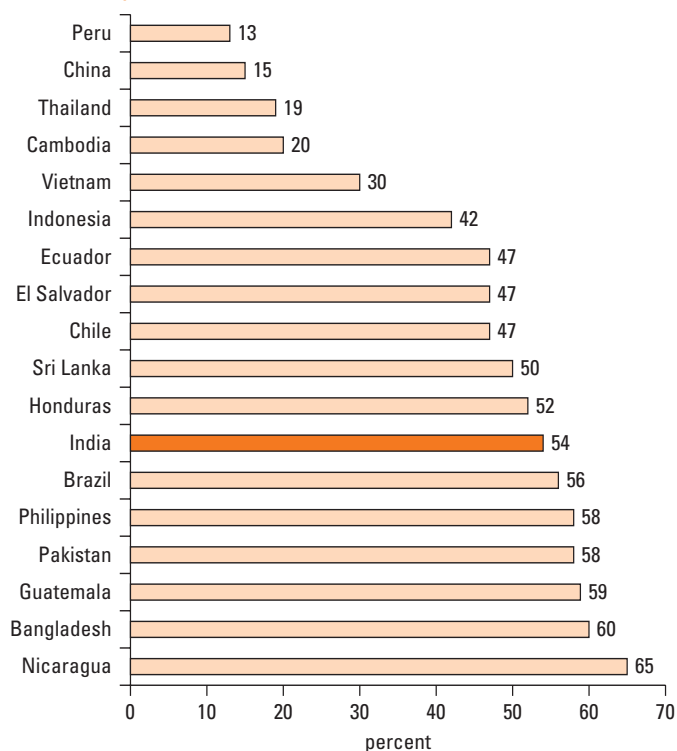
Source: Reserve Bank of India.

Note: Data for March 2006 are available only for public sector banks.

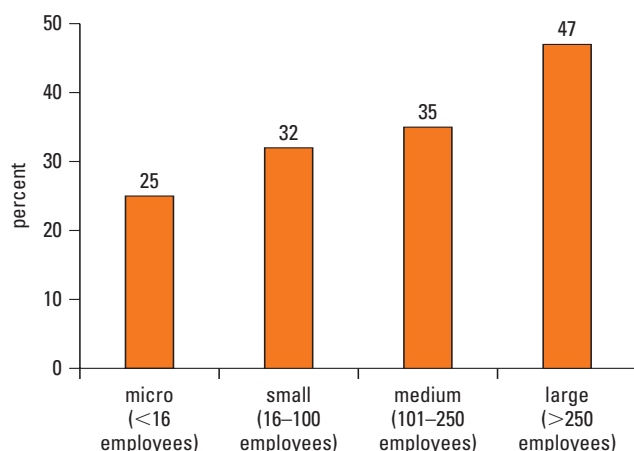
scheme, which provides a 15 percent capital subsidy to upgrade technology for SSI units in specific subsectors and products, benefited only 2,368 units in the six years ending in March 2006. Total CLCSS spending was Rs 43 crore (\$10.5 million) during this period—a small fraction of the Rs 82,275 crore (roughly \$20 billion) in credit to SSIs from public sector banks alone in the fiscal year ending in March 2006.

Enterprise surveys suggest that access to funding for absorption of innovative practices is more constrained for smaller enterprises and traditional industries. The World Bank's 2006 Enterprise Survey found that 54 percent of new enterprise investments (broadly defined as new land, buildings, machinery, and equipment)<sup>18</sup> in India were financed using internal funding—significantly more than in most other developing countries in Asia and Latin America (figure 7.6). But the survey shows considerable variation in these results based on firm size. The smallest (micro) enterprises rely mostly on informal funding (12 percent of their new investment funding), while the largest enterprises rely primarily on commercial bank lending (47 percent of new investment funding; figure 7.7).<sup>19</sup> Survey results also suggest that more sophisticated industries—such as pharmaceuticals, automotive components, machinery, and electronics—have greater access to bank lending to fund new investments than do more traditional industries such as rubber, metals, and garments. The

**Figure 7.6 Reliance on Internal Funds for Financing New Investments, Various Countries, 2006**



Source: World Bank Enterprise Surveys.

**Figure 7.7 Access to Bank Finance in India, by Firm Size, 2006**

Source: World Bank Enterprise Surveys.

medium-tech textiles industry, with its global markets, is an outlier, with substantial access to bank financing.

### Recommendations for Improving Finance for Technology Absorption

Measures aimed at improving access to finance for MSMEs would result in better access to finance for innovative MSMEs wishing to adopt or upgrade technology. Possible measures for government action include the following:<sup>20</sup>

- *Improving credit information on MSMEs* would help cut transaction costs that lead to higher interest rates for these firms. The Credit Information Bureau of India Ltd. (CIBIL) has made considerable progress in recent years and now has a large consumer database and a recently launched commercial database (95 percent of which are MSMEs). In addition, in May 2006 the government passed facilitating legislation to allow banks and financial institutions to share information on their customers with CIBIL. Now CIBIL needs to expand its data sources to include nonfinancial entities (such as utilities).
- *Addressing the issue of collateral* would reduce default risks for lenders. The government can help by improving and updating land and property records, which hamper the use of land as collateral, and by promoting the use of collateral substitutes such as lease-hold land and peer group security in the pricing of loans to small businesses.
- *Introducing legislative changes in mortgage registration* would make the process more customer friendly, and simplify the legal framework for collateral enforcement and loan recovery by introducing alternative, out-of-court methods of dispute resolution. The government could consider extending the Law on

Securitization, Reconstruction of Financial Assets, and Enforcement of Security Interest—which allows for out-of-court settlement of bad loans—to cover smaller loans.

- *Establishing a bankruptcy framework that facilitates the easy exit of small firms* would be beneficial given their relatively high mortality rate. As noted, there is a direct, positive correlation between the ease of exit for firms and the rate of new entry and level of competition in industry. India's tedious, cumbersome bankruptcy and closure regime discourages entrepreneurship. It is common for bankruptcy proceedings to take more than 2 years—and over 60 percent of liquidation cases before High Courts have been in process for more than 10 years. Not surprisingly, when looking at the share of firms that go bankrupt, India has a much lower share (0.04 percent) than do other emerging markets, such as Thailand. This could change once the envisaged amendments to the Companies Act are implemented, providing a new framework for liquidating firms outside the court process.
- *Establishing a policy and regulatory framework that fosters the development of leasing finance* would be effective for financing small, innovative businesses, which face collateral constraints and equity capital shortages. The growth of leasing finance is stifled by an inhospitable tax and accounting framework, introduced after a major leasing finance scam in 1997. As a result of government policy, India's leasing finance industry has shrunk from some 400 firms in the early 1990s to just about 10 today. To revitalize the leasing industry, efforts must be made to improve the tax and accounting framework. Clear rules are needed to help tax officers distinguish between genuine leases and garbed financial transactions. Currently, assessing officers and appellate commissioners create their own rules. Rules are also needed to allow leasing companies to deduct depreciation from lease payments for tax purposes. Finally, the service tax on rentals needs to be reduced, and state governments should revisit their policy of equating a lease with a sale—resulting in taxes on leases ranging from 4 percent to 14 percent.

## Notes

For questions or further information, please contact Inderbir Singh Dhingra at [idingra@world-bank.org](mailto:idingra@world-bank.org).

1. For discussions of these issues, see Ben-Ari and Vonortas (2005), UNCTAD Secretariat (2002), Dossani and Kenney (2003), and Bank of England (2001).
2. After the United States, India has the second-highest number of publicly listed firms. Although the shares of many of these firms are not actively traded on the stock exchanges, their liquidity has improved considerably in recent years.
3. Early-stage finance includes seed capital as well as initial finance required for start-up operations to commercialize an innovation. Although there is no clear definition, early-stage finance is usually classified by amount (say, less than \$3 million), the life of the firm (say, less than five years), or the sequence of external funding available to the firm (say, first two rounds of external finance).

4. Although there is no consensus definition of ESTD, it can be broadly defined as the stage where “the technology is reduced to industrial practice, a production process is defined from which costs can be estimated, and a market appropriate to the demonstrated performance specifications is identified and quantified” (Auerswald and Branscomb 2003: 229).
5. For a summary of these constraints, see World Bank (2006a). For a more detailed discussion, see De Ferranti and others (2003) and Baumol (2002).
6. Based on lower-case and upper-case modeling by Auerswald and Branscomb (2003).
7. These definitions vary, but seed is usually the first round of funding in the life of a firm, and series A and B are subsequent rounds. In the above-mentioned analysis, Evalueserve defines these terms based on amounts invested in the Indian context. Seed is up to \$900,000, series A is \$1 million–\$3 million, and series B is \$3.5 million–\$8.0 million.
8. It has been argued that seed and early-stage financing in India implies investments of less than \$1 million given the lower cost structure for Indian start-ups relative to their Silicon Valley counterparts.
9. APIDC’s management was privatized in the mid-1990s.
10. The Seed Fund, recently created with \$10 million from the former promoters of the Infinity Fund, is one of India’s few successful early-stage venture capital firms.
11. Evalueserve estimates venture capital and private equity investment at more than \$6 billion in 2006. But again, most of this increase is unlikely to be for seed and early-stage funding.
12. India ranks poorly on the World Bank–International Finance Corporation’s Doing Business indicators; see chapter 1.
13. For a more detailed discussion on investment climate issues facing Indian businesses, see World Bank (2002, 2004, 2005, 2006a), National Manufacturing Competitiveness Council (2006), National Investment Commission of India (2006), and *India Today* (2005).
14. Current investment guidelines for pension and insurance funds allow for investment in defined “unapproved” securities; these guidelines can be modified to include or increase the allowable limit for venture capital funds.
15. For further discussion of the evolving “social venture capital” industry, see World Economic Forum (2006).
16. Among government documents, see the Abid Hussain Committee on Small Enterprises (Ministry of Industry 1997), S. L. Kapur High Level Credit Committee on SMEs (Reserve Bank of India 1998), and S. P. Gupta Study Group on Development of Small Enterprises (Planning Commission 2001). See also World Bank (2002, 2003, 2004).
17. Until recently the Reserve Bank of India required banks to submit data only for micro and small enterprises (MSEs), which became classified as a priority sector for bank lending. With enactment of MSME legislation in May 2006, data for medium enterprises are now being collected as well.
18. Used as an approximation for innovation absorption financing, which is related to machinery and equipment.
19. For the purpose of this particular analysis, micro enterprises employ fewer than 16 people, small enterprises between 16 and 100, medium enterprises between 101 and 250, and large enterprises more than 250.
20. Although many of these recommendations apply to MSME financing in general, constraints tend to be greater for upgrading technology and innovative MSMEs, as discussed earlier. Hence, these recommendations are extremely relevant for upgrading technology for MSMEs.

## References

- Auerswald, Philip E., and Lewis M. Branscomb. 2003. “Valleys of Death and Darwinian Seas: Financing the Invention to Innovation Transition in the United States.” *Journal of Technology Transfer* 28 (3–4): 227–39.

- Avnimelech, Gil, and Morris Teubel. 2005a. "Evolutionary Innovation and High Tech Policy: What Can We Learn from Israel's Targeting of Venture Capital?" Working Paper No. 25, Ben-Gurion University of the Negev, School of Management, Be'er Sheva, and Hebrew University of Jerusalem, Department of Economics.
- . 2005b. "From Direct Support of Business Sector R&D/Innovation to Targeting Venture Capital/Private Equity: A Catching-up Innovation and Technology Policy Life Cycle Perspective." Ben-Gurion University of the Negev, School of Management, Be'er Sheva, and Hebrew University of Jerusalem, Department of Economics.
- Bank of England. 2001. "Financing of Technology-Based Small Firms." Domestic Finance Division, London.
- Baumol, William. 2002. *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism*. Princeton and Oxford: Princeton University Press.
- Ben-Ari, Guy, and Nicholas S. Vonortas. 2005. "Risk Financing for Knowledge-Based Enterprises: Mechanisms and Policy Options." Department of Economics, George Washington University, Washington, DC.
- De Ferranti, D., G. E. Perry, I. Gill, J. L. Guasch, and N. Schady, with W. Maloney and C. Sánchez-Páramo. 2003. *Closing the Gap in Education and Technology*. Latin American and Caribbean Studies. Washington, DC: World Bank.
- Dossani, Rafiq, and Asawari Desai. 2006. "Accessing Early Stage Risk Capital in India." The South Asia Initiative, Shorenstein APARC, and The Indus Initiative.
- Dossani, Rafiq, and Martin Kenney. 2003. "Providing Financing for Technology-Based SMEs." Paper delivered at the UNCTAD Expert Meeting on Improving the Competitiveness of SMEs through Enhancing Productive Capacity: Financing Technology, Geneva, October 28–30.
- Evalueserve. 2006. "Is the Venture Capital Market in India Getting Overheated?" Saratoga, California.
- India Today*. 2005. "State of the States Report." September 1.
- Klapper, Leora, and others. 2006. "World Bank Entrepreneurship Survey." World Bank, Washington, DC.
- Kortum, Samuel, and Josh Lerner. 2000. "Assessing the Contribution of Venture Capital to Innovation." NBER Working Paper No. 11475, National Bureau of Economic Research, Cambridge, MA.
- Ministry of Industry. 1997. "Report of the Expert Committee on Small Enterprises, Abid Hussain, Chariman." Government of India, New Delhi.
- National Investment Commission of India. 2006. "Investment Strategy for India: Investment Commission Report." Ministry of Finance, New Delhi.
- National Manufacturing Competitiveness Council. 2006. *The National Strategy for Manufacturing*. New Delhi.
- Planning Commission. 2001. "Report of the Study Group on Small Scale Enterprises." Chairman S. P. Gupta, New Delhi.
- Reserve Bank of India. 1998. "Report of the S. L. Kapur High Level Credit Committee on SMEs." New Delhi.
- Saxenian, AnnaLee. 2001. "Taiwan's Hsinchu Region: Imitator and Partner for Silicon Valley." Stanford Institute for Economic Policy Research, Palo Alto, CA, and University of California at Berkeley.
- . 2005. "From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China." School of Information Management and Systems, University of California at Berkeley.

- UNCTAD (United Nations Conference on Trade and Development) Secretariat. 2002. "Financing Technology for SMEs." Issues Note, Geneva.
- UN ESCAP (United Nations Economic and Social Commission for Asia and the Pacific). 2005. "National Innovation System in the Asia-Pacific Region." Bangkok, Thailand.
- World Bank. 2002. "India Investment Climate Assessment." Washington, DC.
- . 2003. "Small and Medium Enterprises Financing in India: Issues, Challenges, and Opportunities." Policy Note. Washington, DC.
- . 2004. "India Investment Climate Assessment." Washington, DC.
- . 2005. *Doing Business in India*. Washington, DC: World Bank.
- . 2006a. *Doing Business 2007: How to Reform*. Washington, DC: World Bank.
- . 2006b. *Public Financial Support for Commercial Innovation: Europe and Central Asia Knowledge Economy Study Part I*. Washington, DC: World Bank.
- World Economic Forum. 2006. "Blended Value Investing: Capital Opportunities for Social and Environment Impact." Geneva, Switzerland.