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**VENTURE CAPITAL POLICY IN ISRAEL:  
A COMPARATIVE ANALYSIS  
& LESSONS FOR OTHER COUNTRIES**

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## Abstract

Success in developing a Venture Capital industry may require adopting an evolutionary-systemic perspective not only of the processes involved before and during VC emergence but also of policy-business sector co-evolution.

We suggest that the main obstacles in developing a significant high quality VC industry are system failures (and not market failures). This implies that targeted policies aiming to create a VC industry should focus both on system measures such as 'institutional changes' and coordination of actors *and* on attracting professional venture capitalists. Moreover the pattern of investment of the industry should follow a strict VC definition that is 'early phase' investments in high tech start up companies.

Israel's successful experience took place in the background of a very favorable set of conditions, both internal and external, some of whom continued to be favorable during VC industry emergence up to 'Consolidation' towards the end of the 90s. Because of this it is our view that the Israeli experience and Israeli VC policies are not directly replicable elsewhere. What can be adopted are specific aspects of the policies implemented. Also, some aspects of the Evolutionary/Systemic perspective used to interpret the Israeli experience may be applicable to other countries-both to 'interpret' past attempts at developing VC and as possible guides or suggestions for the future. We illustrate this by developing a conceptual framework for VC policy evaluation based on the Israeli experience and apply it to the US and Indian experiences.

Despite early indications of strong capabilities and high potential of Israel's VC industry (a situation enabling us to consider it *Class A*), VC Emergence was not market-led but triggered by a *targeted VC directed policy (Yozma)*. This incentives' program induced entry of high quality, professional agents and VC management teams domestically; and of significant 'intelligent' capital from abroad. It led to reputation effects which engulfed several VC companies simultaneously. This in turn contributed to generate Israel's 'VC industry & high tech' reputation of the second half of the 90s.

Yozma was critical due to three sets of factors: First, it overcame 'coordination & other failures' associated with achieving critical mass, collective learning, cluster effects and economies of scale; second, it tackled specific VC industry characteristics & constraints e.g. creation of *a professional* industry based on 'intelligent', networked capital which assured the rapid accumulation of capabilities and reputation; third, assured a pattern of investment which followed a strict definition of VC.

Yozma was implemented at the right time, the outcome of an evolutionary process and luck. We would emphasize two aspects: *First-* the overlapping of critical mass & collective learning on the one hand with the expanding global technology product & capital markets on the other; *second-* implementation only after 'Class A Industry' conditions were generated (e.g. after suitable experimentation & learning; after appearance of an excess demand for VC services, etc).

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### ***List of Acronyms***

- VC-Venture Capital, Venture Capital companies
- SU- high tech Start Up, high tech Start Up Company
- LP-Limited Partnership
- IVA-Israel Venture Capital Association
- IVCA-Indian Venture Capital Association
- S&T-Science and Technology
- A&T- Avnimelech, G. & M. Teubal
- D&K-Dossani & Kenney
- ITP-Innovation & Technology Policy; ITP J-ITP of Period J (J=1,2)
- SI-System of Innovation
- SF J-System Failure of Period J (J=1,2)
- OCS-Office of the Chief Scientist, Ministry of Industry and Trade (Israel)
- TASE-Tel Aviv Stock Exchange
- ROR-Rate of Return
- SBIC-Small Business Investment Companies
- SBIR-
- VS-Very successful or Very Successful Index
- MSP-Moderately Successful Plus or Moderately Successful Plus Index
- MS-Moderately Successful or Moderately Successful Index
- LS-Less Successful or Less Successful Index
- NRI- Non Resident Indians
- PLC- Product Life Cycle

## **1. Introduction & Objectives**

This paper deals with policies promoting Venture Capital particularly, although not exclusively, targeted incentives' programs directed to *VC Emergence* such as Israel's Yozma Program (successfully implemented during 1993-97). Its focus is *policy issues suggested by the Israeli experience*. In Israel the VC industry did not arise in a vacuum; rather it evolved from a prior setting of high tech and R&D/innovation capabilities. In contexts of this kind Israel's experience (or parts of it) may be relevant. This experience also suggests that a VC-directed incentives' program should not represent the central thrust of Government policy directed to *create* a completely new high tech sector (Gelvan & Teubal 1997).

The paper builds upon prior work on Israel's VC and high tech industries. It also links with a long tradition of research on VC covering both 'positive' and 'normative' aspects.

### ***1.1 Background Research on Venture Capital***

The literature of the 80s e.g. Florida & Kenney (1986,7) among others focuses on the roles that VC played in the innovation process of the US. VCs are active investors and are integrally involved in the creation of startup companies; they are involved in four overlapping networks of innovation: financial institutions; local and global technology markets; professional business service markets; and professional labor markets.

During the 90s we observe at least two strands of literature. The first analyzes how the operation of VC, its mechanisms and organizational capabilities, helped overcome the "lemon" problem (Akerlof, 1970; Myers and Majluf, 1984) and other information-related problems (Stiglitz and Weiss, 1981) associated with the financing of high tech startup companies (for summaries see Gompers & Lerner 1999, 2001). A second strand analyzes the impact of VC on their portfolio companies' success. For example, Florida & Smith (1994) found the VC-backed startup companies are more global than non-VC backed firms while several studies show that the presence of a VC in an issuing firm serves to lower total cost of issuing: it reduces IPO underpricing & also underwriters cost. Other studies show that VC serves to lower bank interest rates on loans while also enabling younger firms to go public (Megginson & Weiss, 1991; Barry, 1990; Lerner and Gompers, 1999). It was also shown that VC-backed IPOs have better post-IPO performances both in terms of stock price and in

growth rates (Megginson & Weiss, 1991) compared to non-VC backed SU. Finally, Megginson and Mull (1991) and Al-Suwailem (1995), compare the post-investment evolution of VC-backed firms to non-VC-backed firms, and found that the VC-backed firms have higher growth in terms of total assets, and revenues, and invest a larger fraction of total expenses in R&D. Research on the Israeli VC industry showed similar results- VC backed firms have superior performance compared with non-VC backed firms, this include higher exit rate, younger age at IPO, higher IPO valuation, and higher growth in sales (Bar, 2002; Lucamat 2001; Avnimelech 2002) More recently Kortum & Lerner (2000) found that VC in the US spurs technological innovation both among the firms receiving the financing and within the entire sector. According to their paper on average each dollar invested by Venture Capitals contributes to the rate of patents 3 to 4 times more than corporate R&D. Moreover, from the late 1970's to the mid 1990's VC represented only 3% of corporate R&D, but responsible for 10%-12% of privately funded innovation.

#### *VC Policy literature*

All in all the above literature is testimony that significant progress has been made in understanding the operation and impact of VC. This contrasts with research on *VC policy* which has been much less extensive and much less focused and successful in generating new knowledge. It is our belief that part of the problem resides in the policies implemented themselves- their simplistic underlying assumptions and their widespread failure, both of which explain why no satisfactory conceptual framework has yet been developed. It also explains why we believe that Israel's successful Yozma program could trigger the creation of such a policy framework.

Public policy aimed at stimulating venture capital was significant in the early-mid 1980's when most of the European countries implemented VC-directed policies. Most focused on the VC supply side – how to increase the pool of VC capital, through reduction of capital gain taxes, tax benefits, preferred loans and government guarantees (OECD op. cit). Very little attention was given to measures to stimulate the demand of VC – the establishment of startup companies, both in terms of quantity and of quality. Moreover with few exceptions no serious attention was given to measures to attract professional high quality VC managers and firms into the VC industry. One exception is Poterba (1989) who examines how and whether capital

gain taxation influenced the growth of the VC industry. He examines both the supply side - pool of capital to VC funds; and the demand side – the motivation of individuals to become entrepreneurs and to join startup firms. But even in his work no attention is given to the creation of a pool of knowledgeable, professional VC managers despite the strong supply inelasticities in their generation (Gompers & Lerner 1999 op. cit Chapter 1).

By the late 1980's and early 1990's the scant success of such programs led to a generalized disappointment with VC policies in general. Again a precursor was Florida (1990, 1994) who argued that government programs aimed at developing national VC industries failed. This failure was related to the following facts: VC investments flow mainly to established high tech centers regardless of the geographical location of the VC industry-a fact which means that it has a weak impact in regions without established high tech clusters<sup>1</sup> It follows that for VC-directed public policy to be successful the VC industry support must be part of a broader & more comprehensive set of policies which supports the whole high tech cluster (R&D, innovation, startups, and exit). These conclusions have been confirmed by other research claiming that government policies are not effective in the creation of a successful VC industry. These views caused most researchers at the 1990's to ignore policy issues in the field of the VC industry.

The interest in public policy for VC rose again in the aftermath of the enormous success of the VC industry in a number of countries during the 90s & a few successful government policies supporting and triggering VC industries (these included the Yozma program in Israel). Black and Gilson (1998) emphasize the interaction between the strength of the local IPO market and the development of the VC industry. Jeng & Wells (2000) shows that "the initial public offering market does not seem to influence commitments to early stage funds as much as later stage ones". In general this strand of research suggests that the strength of the local IPO market is mainly related to late stage VC investment while the supply of high quality startup firms is more significant to early stage VC investments. Lerner (1999) and Gans & Stern (2000) examined the success of the SBIR program in the US (a significant program supporting SU companies in the US). Other research tries to explain the reasons why government VC programs succeeded in some countries while failed in others.

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<sup>1</sup> Thus the impact of VC is context sensitive since it may have a significant high tech growth impact in established high tech regions.

Despite the above and despite the fact that some recent policy-related research in the field takes into consideration both VC demand and VC supply, most of existing research still ignores issues of organization; how to attract professionals to the VC industry; & how to stimulate cumulative learning and VC capabilities generation. The orientation up to now focused on incentives- particularly supply incentives- rather than how to develop a high quality, professional, VC Industry.

### ***1.2 Recent Research on Israel's Venture Capital Industry***

In recent work (see A & T 2002b) we analyzed the emergence and development of a Venture Capital Industry in Israel and its role in the recent successful growth of Israel's high tech cluster. Taking an Evolutionary & Systemic perspective we trace the co-evolutionary and dynamic process involving the business sector, technology policies, venture capitalists, individuals & Start Up companies, and foreign linkages. VC emergence is part & parcel of the reconfiguration (Teubal & Andersen 2000) of a pre-existing Electronics Industry one involving large amounts of SU and new and powerful links with global capital markets. The main conclusions and policy lessons of the paper are that specific technology policies targeted to the Venture Capital sector can be effective in causing VC Emergence only to the extent that a) favorable background conditions exist or are created; b) a pre-emergence period existed with significant amount of *informal* VC & SU *related* activities; and c) the design & timing of such a policies was such that they led to the early and rapid accumulation of reputation & capabilities.<sup>2</sup>

In Israel *Background Conditions* included a pre-existing high tech industry which developed considerable innovation capabilities during a 10-20 period-a result of a coherent and important Horizontal Program supporting company R&D<sup>3</sup>; significant restructuring of the pre-existing Military-dominated Electronics industry during the second half of the 80s; domestic stabilization policies & capital market liberalization; and globalization of technology capital markets (Nasdaq). Also business links with US industry & capital markets (spurred by a program called BIRD which promoted joint R&D between Israeli and US companies<sup>4</sup>) were being

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<sup>2</sup> The emergent properties of the re-configured high tech cluster were: A VC market/sector comprising large numbers of SU & VC; an increasing weight of SU 'output' in total high tech output; & strong links with Global Capital Markets

<sup>3</sup> An unintended effect of the Horizontal R&D support program was to generate awareness of the weak links in the system.

<sup>4</sup> Our presumption is that Israeli companies through this program accessed US product markets; and through positive feedback effects in the form of networks, reputation and links enhanced their access to US Capital markets. Between 1984-88 Israeli

established. Moreover, during *Pre-emergence*(1989-92) a considerable amount of *business experiments* took place- both with respect to the structuring of a new type of SU oriented both to product and to capital markets (with some success stories), & also in relation to VC-related activities. There was also important policy experimentation and learning e.g. from the launch of the relatively unsuccessful Inbal program in 1992 & from the Technological Incubator's program. This together with the rate of SU creation at the time and large-scale failure in implementing R&D results suggested the existence of a 'Systemic' failure in Israel's business sector. Policy makers eventually converged into the means to overcome this deficiency—creation of a domestic VC industry with a dominant Limited Partnership (LP) form of organization.

The pre-emergence conditions specified above enabled an appropriate design of a Targeted VC policy program(Yozma) which stimulated VC entry of professional VC companies & 'collective' learning. These and other factors spurred a self-reinforcing, cumulative process of VC emergence & development. VC-SU co-evolution, which parallels supply-demand & user-producer links and interactions in young markets, represented one important axis and distinctive characteristic of the cumulative process that took place in Israel. Other distinctive aspects are the large numbers of IPOs in global markets; the large scope of M&A activity which took place); and the favorable world product & capital market conditions (at least till 2000).<sup>5 6</sup>

We conclude that the emergence of Israel's Venture Capital industry could be visualized as a *path dependent* process involving a broad set of economic, societal and even geopolitical factors—some endogenous & some exogenous- spanning 2-3 decades.

### ***1.3 Venture Capital and High Tech Development during the 90s***

During the 90s, the evolution of Venture Capital has been linked to the evolution of high tech, although there are significant differences among countries in

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technology companies raised \$300M in NASDAQ while only \$500M was raised by all Israeli companies in the Tel Aviv Stock Exchange. We might say that a path and link to NASDAQ-so important in the 90s-was blazed during the 80s.

<sup>5</sup> Self-reinforcement through positive feedback effects also resulted from early successes which, through enhanced Reputation Effects, led to new Successes (Shertler 2002).

<sup>6</sup> An example of self-reinforcing effects concerns the indirect effects of the Yozma Program on collective learning. Thus after three years of program implementation (in 1996) the Israel Venture Capital Association was created by 3-5 managers of Yozma Funds (its first director was Yigal Erlich former Chief Scientist and architect of Yozma). This industry association performed some of the roles that WEMA performed in Silicon Valley during the 70s e.g. gathering and diffusion of information (Saxenian op. cit pp 47-8 ), both printed information about the industry and the sponsoring of a systematically successfully yearly Meeting with broad participation of individuals from high tech, SU, VC, & other financial institutions from Israel and abroad.

this respect.

*Grosso Modo* the Israeli high tech experience of the 90s is seemingly quite similar to that of Silicon Valley (both during emergence and during the ‘reconfiguration’ of the 80s/growth in the 90s, see Saxenian op. cit, Chapter 5). The main difference concerns policy: despite numerous US Government Programs supporting small companies and also R&D (see Lerner 1999) and despite the role of the SBIC program (see 5.1 below) there was no background ‘backbone’ program which parallels the role of Israel’s Horizontal R&D Grants Scheme<sup>7</sup>. Moreover, despite the importance of the US’s SBIC program for the subsequent emergence of Venture Capital, there was no targeted policy directed to create a proper Venture Capital industry (despite some general policies in the US such as a reduction in the capital gains tax which also had an effect on VC). Notwithstanding these differences in terms of degree of success, the importance of SUs, VCs, their co-evolution & links with NASDAQ-Israel seemed to have followed quite closely the previously tested Silicon Valley model. Moreover, in Israel (Teubal & Avnimelech 2002b) and in other high tech clusters (Breshnahan, Gambardella and Saxenian 2002), existing industry also provided the SU segment with entrepreneurs & with significant management spillovers.

In contrast to its similarity with Silicon Valley, the Israeli pattern of VC emergence and high tech cluster reconfiguration seems to be very different from that experienced in other recent high tech clusters. The Cambridge (UK) cluster for example was probably less successful than Israel’s (Breshnahan et al op cit). This may be related to significant differences in policy (both innovation support in general and targeted support of VC), in the ‘intensity’ of SU & VC, in the extent of their co-evolution, and on the strength of its links with US product & capital (NASDAQ) markets & with US VCs. This makes for a very significant difference. Similarly with India’s software industry & cluster in Bangalore: while the degree of success is at least comparable to that of Israel (in many respects it may be higher) there are important differences. Among these we can mention emergence of a new Software industry rather than ‘re-configuration’ of previously extant IT high tech industry as was the case in Israel; a focus on ‘services’ rather than ‘products’ & R&D; a process

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<sup>7</sup> This program extended grants to R&D performed by business enterprises since the early 70s. These grants covered approximately 50% of ‘approved’ costs of projects submitted to and accepted by the OCS. Support was consistent through time and continued throughout the 90s (with modifications) also during VC industry Emergence. It was open to all firms independent of sector or technology.

led by large companies rather than by SU & VC; and only a few linkages with NASDAQ<sup>8</sup>.

A second point is that VC should be regarded-at least as regards to 'early phase' investments- as a domestic, relatively non traded 'service' which might be stimulated or triggered once a high tech sector exists and attained a certain size<sup>9</sup>. A third point suggested by the Israeli case concerns the importance of a Mix of Policies (Teubal & Andersen 2000) e.g. an horizontal policy implemented first which helps create favourable background conditions in terms of innovation capabilities & emergence of high-tech within the business sector; and a subsequent targeted policy directed to the VC industry. *Policy (more specifically, ITP)-Business Sector co-evolution* lies at the root of this process since the initial program's impact on the business sector helped identify the economy's comparative advantage in innovation & high tech; and indirectly, the specific 'needs' or priorities which a subsequent targeted program should address<sup>10</sup>. This process fits the SI perspective to ITP quite well (Teubal 2002) with it's emphasize both on 'sequences of programs' & on a 'portfolio of coordinated programs (& policies)'. Both underscore the limitations of a piecemeal analysis of the impact of a single ITP program.

#### ***1.4 Objectives of Paper***

The papers three *main* objectives are:

- 1. Undertake a detailed analysis of the Yozma Program in the context of the evolution of high tech in Israel and emergence of a VC industry during 1993-8*
- 2. Develop a conceptual framework for the assessment of VC policies*
- 3. Undertake a Preliminary assessment of the VC policies of a selected number of countries- principally the US & India*

In Section 2 we extend our previous work on the nature and impact of Yozma (see A&T 2002a,b,c) by emphasizing a) the integration of selected microeconomic aspects of Israel's VC industry; & b) issues of VC organization & professionalization. In Sections 3 & 4 we propose a *conceptual framework* for an analysis of VC policies, one that evolved from our Systems/Evolutionary analysis of

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<sup>8</sup> We can expect a stronger similarity in the future (see A & T 2002d) given the likelihood that a new phase in & a new segment of the Indian IT/Software might emerge with features similar to those of Silicon Valley and Israel: returning nationals, product software and hardware, large numbers of SU & VC; and strong links with global capital markets.

<sup>9</sup> Both of these points suggests the importance of the timing of policies within an overall evolutionary framework.

<sup>10</sup> Within the co-evolutionary framework mentioned, the former program would generate 'variation' (to a large extent 'random' variation, see Nelson 1995) and also pave the way for identification & selection of areas where further support is required.

the Israeli case. This framework comprises a number of *elements* including setting the analysis of targeted VC-directed policies into a broader *Infant Industry perspective* (Section 4). Finally in Section 5 we attempt a preliminary application of this framework to the analysis of VC policies in the US and India.

## **2. The Yozma Program (Policy Process, Design & Impact)**

### ***2.1 General***

New National Priorities emerged with the beginnings of the massive immigration from the former Soviet Union during the early 90s. The Government of Israel began searching for means to employ the thousands of engineers that came to this country. Simultaneously the Military Industries had laid-off hundreds of engineers; and many startup companies were created only to subsequently fail. In fact an official report of the late 80s mentions that 60% of the technologically successful OCS-approved projects failed to raise additional capital for marketing. This suggests both a capital gap and absence of marketing capabilities (also a bias towards technology in the OCS approval process).

Simultaneously officials in the Treasury (who had good undergraduate training in Economics) realized that despite massive Government support for R&D there still was a clear 'market failure' ('System Failure' in our view) which blocked the successful creation and development of Startup companies. This was also related, not only to insufficient sources of R&D follow-up finance but also to weak management abilities.

The outcome was a gradual shift in policy objectives from promotion of R&D to enhancement of SU formation, survival & growth. This was also a response to the new model of Hi Tech linked to the recent 'globalization' of technology Capital Markets. The new context involved new opportunities for peripheral economies namely the possibility for the first time and in a systematic way for high quality SU to launch IPOs in global markets. This not only could provide a relatively fast return to inventors, entrepreneurs and early investors (including angels and VCs) but also the resources and exposure to penetrate *global product markets* (particularly the US-see T & A 2002b). Exploiting the new possibilities however required changes at both the company and Systems (SI) levels. Moreover their existence (or lack of it) increasingly became a source of country comparative advantage (disadvantage) and company competitive advantage (disadvantage). It became increasingly clear that, under the

new conditions, the traditional OCS support of R&D was not enough.

The head of OCS or “Chief Scientist” at the time, Ygal Erlich, pondered about how to make OCS support more effective. Prior to the emergence of Venture Capital he could not find even one real success "similar to those we see today" (interview 1/98). The basic problem was lack of capability to grow after the product development phase. He arrived at what could be seen as a Vision and Strategic Perspective for Israel's high tech. This involved two elements: first the weak links in the system were both 'finance' *and* 'marketing/management'; second- the way to overcome the deficiency was to foster Venture Capital. <sup>11</sup>

#### *A First Attempt: Inbal*

The Inbal Program was the first attempt at implementing a targeted ITP directed to the VC industry. It was launched in 1992 one year before the implementation of Yozma. Its central idea was to stimulate *publicly traded* VC funds by guaranteeing the Downside of their investments. The mechanism used was a Government Insurance Company ("Inbal") that guaranteed VC funds traded in the stock market (TASE) up to 70% of initial capital assets. The program imposed certain restrictions on the investments of the VC companies covered by the program ('Inbal Funds'). Four (4) funds were established. They and the Inbal program as a whole were not a great success. Inbal fund valuations in the stock market were low, similar to Holding Companies' valuations. Moreover, the funds encountered bureaucratic problems and had to go to great lengths in order to prepare regular period reports. Eventually all of them attempted to leave the program, which they eventually did. The funds did not succeed financially and, for a long time, did not grow. Today all the (former) Inbal Funds are 'held' by one holding Company (Green Technology Holdings).

Inbal supported publicly traded VCs with guarantees to the downside. There was no mechanism for drawing professional people with VC abilities into the program; it did not generate VC companies with adding value capabilities (including those coming from investors); and it was exposed to 'stock market sickness' & short term thinking. The model of VC company organization was not imitated, and the 'social impact' of the Inbal Program was probably very low (there was some indirect impact in the sense of having consolidated the desirability of a LP form of VC organization).

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<sup>11</sup> At the time, there were only 2-3 privately held, very small Venture Capital Companies operating in Israel. For this (& other) reasons it was clear that the total capital available for supporting SU activity was inadequate.

Policy makers and business men alike learned from Inbal's weak impact: the difficulty in publicly traded VCs of having investors contribute to the operation of the fund; greater difficulty to rapidly exploit reputation earned from early exits in order to raise new capital; limits on management decision making flexibility and on management compensation; and last but not least- absence of incentives for the “upside” (an important factor in attracting professional VCs)

## ***2.2 The Design of Yozma<sup>12</sup>***

The program began operating in 1993. The explicit objective was to create a solid base for a competitive VC industry with critical mass; to learn from foreign limited partners; and to acquire a network of international contacts. It was based on a \$100M Government owned VC fund (with the same name) oriented to two functions: a) investment in private VC funds ('Yozma Funds'-\$80M); and b) direct investments in high tech companies-\$20M (through the Government –owned 'Yozma Venture Fund'). The basic thrust was to promote the establishment of domestic, private LP VC funds that invested in young Israeli high tech startups (‘early phase investments’) with the support of government and with the involvement of reputable foreign financial/investment institutions (generally a foreign private equity company with or without a VC arm). Such funds must be managed by independent, Israeli VC Management Company. Each ‘Yozma Fund’ would have to engage one such foreign institution together with a well-established Israeli financial institution. This emphasizes the point that the Yozma program favored entry of professional managers or of individuals with VC abilities into the infant VC industry. An approved fund that fulfilled these conditions, the Government would invest around 40% (up to \$8M) of the funds raised. Thus \$100M of Government Funds would draw \$150M of private sector funds (domestic and foreign).

Yozma did not simply provide supply, risk sharing incentives to investors-- as was common in other Government VC support programs (it did not provide guarantees nor tax benefits; nor was it accompanied by new regulation rules for Pension Funds<sup>13</sup>); its main incentive was in the ‘upside’ that is when VC investments were very profitable. Each Yozma fund had a call option on Government shares, at

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14 Most of the material below was obtained from two interviews (1/98 & 5/00) with Ygal Erlich the CEO of Yozma and the (or one of the most important) architect(s) of the Program. Additional material was obtained from a lecture he gave at the University of Pavia in February 2001; and from other sources.

13 Capital Gains tax was relatively low at the time and Pension Funds were allowed to invest a small amount on VC subject to Government regulation. In both respects Israel's situation was 'level playing field' with that of other countries at the time.

cost (plus 5-7% interest) and for a period of five (5) years.

The program also assured the realization of 'supply side learning' through the compulsory participation of foreign Financial Institutions ('learning from others"-a standard mechanism of infant industry development in developing countries); through participation of the Yozma Venture Fund manager (Yigal Erlich & other OCS officers) at the board meetings of all Yozma funds (they probably acted as a node in a vast information network); and through the presumed stimulation of co-investment among Yozma Funds. Culturally speaking the stage was set for a lot of informal advising and interaction among the managers of the Funds. 'Demand side' support was provided not by Yozma itself but by the Backbone 'R&D support & Technological Incubators Programs (see A & T op. cit). Another major point was the pursuing of an aggressive investment policy, spearheaded by Yozma Venture Fund.

A total of 10 private 'Yozma funds' were created by the Yozma Program- to which should be added the Government-owned Yozma Venture Fund which started operating in 1993 ( it managed 20 million of the 100 M\$ ; and it was privatized in 1997). Six 'Yozma Funds' were founded in 1993: Gemini, Star, Concord, Pitango, Walden & Inventec; one in 1994: JVP; two in 1995: Medica & EuroFund; and one in 1997: Vertex. The total capital raised by Yozma funds was about \$250 million (\$100 million out of it government capital) and they invested in over 200 startup companies. Box1 below summarizes the main features of Yozma's design.

### Box 1: Critical Dimensions of Yozma Program Design

<i>Favoured type of VC company (Limited Partnership, Closed End Fund):</i> Nine of the Funds adopted this form of organization, the remaining one was a Public VC Fund
<i>A focus on Early Phase investments in Israeli high tech Startup companies</i>
<i>Target Level of Capital Aimed at 200-250M\$ (Government Support- 100M\$)-</i> this was the 'Critical Mass' of effort required for VC industry 'emergence'
<i>A multiplicity of privately owned Israeli VC Funds (10) each one managed by a local management company &amp; involving at least one Reputable Foreign Financial Institution (and one important Domestic Financial Institution)</i>
<i>Government Participation in each Fund-8 million dollars (in most Yozma Funds this represented 40% of the 20 M\$ raised)</i>
A 20M\$ Government Fund which directly invested in Israeli High Tech companies: <i>This VC was called 'Yozma Venture Fund' (which should be distinguished from the Yozma Program)</i> . Its aggressive investment policy stimulated investments by Yozma Funds.
<i>Strong Incentive to the "Upside"-</i> the possibility, within a 5 year period, of purchasing Government's share at approx. at cost (all Funds except 3 made use of this option). <i>There was no downside 'guarantee'.</i>
<i>Planned 'Privatization' of Yozma Venture Fund:</i> took place in 1997. This previous features assured that the Yozma program was <i>Catalytic Program.</i>
<i>The Yozma Program triggered a strong process of collective learning.</i>

An indication of Yozma Funds' success in triggering growth of the industry is their expansion, which took the form of 'follow up' funds not supported by the Yozma Program. This contrasts with Inbal funds that in most cases did not raise additional funds after establishment. Most Yozma funds (and some other funds as well, who indirectly learned from the Yozma experience) were followed by one or more funds managed by an expanding but related core of managers. Again this contrasts with the Inbal program, where no additional Inbal-type VC Company or companies were founded after the original core of 4 public VCs (a few public VCs were founded in 1999-2000 but this was a result of the 'bubble'). *The total sums managed by this group amount to about 5 \$billion during early 2001.* This is a large share of total VC industry capital managed then. Another measure of the success is the rapid entry of non-Yozma related funds, something triggered by the handsome profits obtained by Yozma Funds; and creation by the managers of 3 Yozma funds of the IVA in 1996. Most Yozma Fund managers are dominant figures in the VC industry today.

In A&T (2002b,c op cit) we provide an 'explanation' why Yozma, through critical mass effects and other factors became the trigger for VC industry emergence and for the onset of a cumulative process of development fed by positive feedbacks and self-replication. Over an beyond favorable background conditions already mentioned and other features of the pre-emergence period we would like to point out here the role of three additional factors: a) the likely prior existence of 'unsatisfied

demand' for VC services- a consequence of a pre-existent pool of SU which included some high quality firms (Checkpoint, Memco, Galileo, and ESC among others) who made a significant direct and indirect contribution to cumulativeness & emergence;b) overlap between the learning & cumulativeness process on the one hand and the rising Nasdaq index & expanding market for Communications & Internet-related Equipment & Software on the other (this overlap was not so consistent in other countries where VC-SU co-evolution began operating after 1996/7 rather than in 1992/3); and c) Yozma's successful design. Another no less important factor was the increasing globalization of capital markets including a new trend during 1995-2000 of global flows of US VCs and US institutions investing in VCs. Some aspects of the program design and of the process leading to it are mentioned below.

### ***2.3 Comparing Yozma with Inbal***

A comparison of Yozma and Inbal will further emphasize the crucial role Yozma's design. Both programs had the same goal; their date of initiation differed by only one year; and there was a 5 (or more) year overlap in implementation. We can thus isolate the role of program design in explaining their differential performance.

#### **Box 2: Factors Explaining the Differential Yozma-Inbal Impact**

<b>YOZMA</b>	<b>INBAL</b>
Created a critical mass of VC investment in Israel	Did not created a critical mass of VC investment in Israel
Most 'Yozma fund' still are among the 20 leading VC companies in Israel	Non of the INBAL fund are among the 20 leading VC companies in Israel
Investments focused on early stage high tech SU	Investments also in later stages
Yozma Funds were models for the design of many other VC companies in Israel	Very few other public traded VC were established in Israel
Brought global financial and strategic investors into Israel	INBAL didn't bring any new global financial and strategic investor into Israel
Yozma Funds were involved in creating the IVA	Not involved
Very high private VC performance	Low private VC performance
Follow up funds and strong growth of capital	Very few secondary issues and limited growth in capital
YOZMA Venture Fund started to invest immediately. This encouraged other VCs to invest	No mechanism to encourage VC firms to invest immediately. This explains absence of a critical mass impact

### Box 3: 'Design' aspects of YOZMA & INBAL Programs

YOZMA	INBAL
Promoted by the OCS & mostly structured as Fund of Funds w/ Single Objective of creating a VC industry	Promoted by the Treasury & structured as a Government- owned Insurance company (w/same name). Dual objective: Promoting TASE and creating a VC industry.
Limited partnership form of VC-the ideal form of organization according to US experience and to Agency Theory. <sup>14</sup>	Publicly traded form of VC; no value added; public market sicknesses; hard to leverage current success to fundraising, low incentives for managers, and bureaucracy.
Leveraged Incentives to the Upside. This induced professional VC teams to get organized as 'Yozma' Funds. They invested in high risk/high expected return SU.	Downside guarantees, which favor entry of non-professional VC firms focused on minimizing risks rather than materializing expected returns through selection, monitoring and added value activities
No Government intervention in the day by day operation of Yozma Funds	Government frequently intervened and imposed bureaucratic requirements on VCs supported
Limited period of government incentives <sup>15</sup> ; and clear and easy way out of the program.	Unlimited period of government incentives and complex way out of the program.
VC abilities was one important criterion for selection of 'Yozma Funds'. There was flexibility in the choice of the funds. Personal recommendation of the OCS was important	Administrative & financial criteria figured prominently in selection of Inbal VCs (there being no assurance of existence of specific VC abilities). No OCS recommendation required
Limited number of Yozma funds planned created an incentive to join fast. This in turn contributed to creation of critical mass in two three years.	No explicit limit (neither time nor money) to the number of funds that could enjoy the INBAL benefit.
The program was designed and implemented by the OCS who was skilled in promoting high tech industries. It was a consensual outcome of an interactive policy process which included the Treasury, the private sector and foreign investors.	The program was designed and implemented by the Treasury who had no specific hi tech knowledge & who emphasized financial rather than 'real' aspects. Presumed limited interaction with relevant stakeholders; and a more limited consensus among all interested parties.
Strong incentive to collective learning, to VC cooperation, and to 'learning from others' (through requirement of having a reputable foreign financial institution)	No incentive to collective learning, to learning from others or to VC cooperation (legal limitations to cooperation).

#### 2.4 Yozma's Impact: Macro level Analyses

Prior to 1990 there were only two formal VC companies in Israel- the Athena fund (founded in 1985) and Star Ventures (founded in 1989). After implementation of 'Yozma' in 1993 we observe a rapid growth of the VC industry both in terms of capital raised and in terms of number of funds active in the industry (see Tables 1 & 3). During the second half of the 90's, the Israeli VC industry becomes a significant player with a huge influence on Israel's hi-tech industry. It was then that the first foreign VC companies began to invest *directly* in Israeli SU.

<sup>14</sup> General partners have full investment & management control a fact which provides wide flexibility in operations. LPs also have tax benefits, legal defense of investors, & a direct link between owner-manager compensation and VC performance.

<sup>15</sup> Yozma Funds could purchase Governments' 40 % share during a period of 5 years after foundation.

Table 1: Capital Raised and new SUs backed by Israeli VC firms

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
<b>Total Capital Raised</b>	58	160	372	374	156	397	727	675	1752	3288	1600	8559
<b>New VC backed SUs</b>	10	20	80	90	80	200	219	252	338	513	221	1802
<b>New SU</b>	40	40	50	50	100	200	350	350	550	850	NA	2605

\* Source IVA, OCS, CBS and other sources (statistics and estimates).

Table 1 shows a significant increase in SU numbers occurred during VC emergence. About 750 Startup companies were founded during 1993-7; and many more during the late 90s. This reflects the impact of the Yozma Program and the increased availability of VC. There are direct & indirect effects. The *direct* impact of Yozma is reflected in the growth of (gross) *accumulated* numbers of new VC-backed SU companies from 110 in 1993 to 730 in 1998. After 1995, the yearly flow of new SU is such that it exceeds the yearly flow of new VC-backed SU (thus reversing the situation of 1994 & 1995). This suggests an *indirect* impact of VC expansion namely an acceleration of SU formation. All in all we observe a sharp rise during the 90s in the proportions of VC-backed SU companies. Our thesis of strong VC-SU co-evolution (A & T 2002b) is consistent with this data.

#### Growth in IPOs and M&As

Elscint's 1972 IPO (the first IPO in the US of an Israeli high tech company) did not signal the beginning of a new era as far as links with the US capital market is concerned. Only small numbers of Israeli companies undertook an IPO in NASDAQ (or in other markets) till the 80s. The situation changed dramatically during the 90s. By 2000 over 150 Israeli (or Israeli-related) high tech companies traded in foreign capital markets (see table 3)- the overwhelming majority in NASDAQ. 'All Public Offerings' (Table 2) show two significant increases in numbers: during the decade of the 90s compared to the previous decades; and after 1995 compared to 1991-94. A final very important point is the increase in the share of VC-backed issues from roughly 30% at or before 1997 to over 70% in 1999-2000. The picture, which emerges, is one of increasing maturity of Israel's high tech industry on the one hand (due to learning and other cluster effects such as the creation of the VC industry itself); and increases in the Nasdaq index on the other.

Table 2: Number of IPOs of Israeli companies in US and EU capital markets

	All public Offerings			VC backed public Offerings		
	Number of Offerings*	Capital Raised (M\$)**	Number of IPOs	Number of Offerings	Capital Raised (M\$)**	Number of IPOs
<b>Before 93</b>	~30	~500	~25	4	~60	3
<b>1993</b>	18	529	16	7	103	6
<b>1994</b>	10	336	8	5	35	4
<b>1995</b>	16	608	12	7	210	5
<b>1996</b>	31	1037	24	13	535	12
<b>1997</b>	24	1074	16	8	175	5
<b>1998</b>	14	907	14	5	144	5
<b>1999</b>	20	3172	20	16	1073	14
<b>2000</b>	36	2842	31	29	1530	24
<b>2001</b>	6	1259	2	2	118	2
<b>2002</b>	2	522	0	0	0	0
<b>Total 90's</b>	<b>~207</b>	<b>~15,500</b>	<b>~168</b>	<b>96</b>	<b>~4000</b>	<b>80</b>

Sources: website of Nasdaq, NASE, EU capital markets, Yahoo finance, and Globes Newspaper.

\* Including IPOs, secondary and debt offering of all Israeli and Israeli related companies (high tech and none high tech) that are traded or were traded in Nasdaq \*\* US capital markets only.

Table 3: Israel's high Tech Cluster of the 90s

YEAR	2000	90	80
Number of SU:	~3000	~300	~150
Number of VC Companies:	~100	2	0
Funds Raised by VCs: M\$	3400	~49	0
Capital Invested by VCs: M\$	1270	~45	0
Accumulated No of IPOs (high tech):	~150	9	1
Accumulated VC-backed IPOs:	~80	3	1
Accumulated capital raised by SU in NASDAQ and EU B\$	~15	<0.25	<0.1
Accumulated value of Israeli SU acquired by foreign MNE: B\$	~20	<0.25	<0.25
Share of IT Exports in Total Manufacturing Exports	~46%	~33%	~20%
Share of high tech industries in GDP	34%	24%	NA

Source: SU numbers come from three sources: CBS, OCS and IVA.

\* Frequently the figures in the box are approximations due to gaps in data, multiples sources of information, and fragmentary information from non-official sources

## 2.5 Yozma's Impact: Microeconomic insights

Previous work on VC emergence in Israel, VC-SU co-evolution and on the role played by Yozma was largely based on 'industry level data' e.g. Numbers of SU companies, VC companies, capital raised and invested per annum, etc. In what follows we report on additional policy-relevant insights derived from an in-depth interviewing of 19 VC companies<sup>16</sup> (approx. 50 VC funds) including 8 'Yozma' VC companies who were founded during the pre-emergence & emergence periods.<sup>17</sup> On the methodological side the major thrust was the construction of indices of VC company **private performance (Pp)** and **social impact (Ps)**. These were subsequently used a) to further characterize VC-emergence; and b) to further reinforce our analysis of the role of Yozma. In fact our micro-economic analysis leads

<sup>16</sup> In 17 out of the 19 interviewed we completed assembly of all information in order to build the indicators shown below. With only 13 we could be reliable indices (see below).

<sup>17</sup> In A & T 2002a,b we distinguish three phases of the VC industry during the 90s: Phase 1-1993-5; Phase 2-1996-8; Phase 3-1999-2000. The VC industry emergence process comprises Phases 1 & 2; while the arrival to maturity or VC Consolidation-Phase three. In what follows Phase 1 will be termed 'early emergence'.

to an additional component or element in the conceptual framework & methodology for Evaluating VC policies in 'follower' countries (see Sections 2 and 3.3 above). This could be termed an *Infant Industry Perspective* (see Section 4 below).

### 2.5.1 VC Performance & Social Impact Indicators

Ascertaining VC-performance is not easy due to incomplete (& sometimes high cost) of accessing information about events that occurred *and* because Israel's VC industry is young (effectively not more than 8-9 years at 8/00<sup>18</sup>). This means that only the first Funds raised by VC companies during Phase 1 of the industry--1993-95--would have completed the "exiting" process while other funds (both follow-up funds of incumbent VCs and first funds of more recent entrants) would only complete this in the future. Thus only a subset of VC companies and VC funds could be fully included in the analysis of 'VC Performance'; and, even within this group, a full Rate of Return (ROR) calculation goes beyond the possibilities of this paper. In fact, we will see that the use of '*qualitative*' or '*mixed*' indicators is inevitable at this stage. Also a measure of *judgment* will have to be applied for assigning VC Companies to Performance Categories. We believe that under these circumstances the use of a number of different (including '*mixed*') indicators enhances robustness of the results<sup>19</sup>.

A second problem concerns the distinction between what may be termed *Private VC Performance* and *Social (to High Tech or to the Economy) VC Impact*. For example, a fund with a low ROR may still have contributed significantly to the national economy and to the growth of a VC industry (and high tech cluster) due to *indirect effects, externalities or spillovers*. *Absolute* measures seem to be important both for private and for social VC performance. In an imperfect capital market & heterogeneous industry setting a VC contribution to private profits depends not only on its ROR but also on the absolute investment undertaken and on other absolute measures. This will also affect the social impact of the VC (e.g. a very small fund with a very high ROR might still represent a small impact to the national economy and to the VC industry relative to a much larger fund with a lower ROR). Among the reasons for absolute measures of VC activity to affect social impacts are: 1) **Reputation** effects-which might be stronger when accumulated by larger entities (Gompers & Lerner 1999 op cit); 2) **Networking**: most global investors would not invest in a small

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<sup>18</sup> End of period to which our information relates.

<sup>19</sup> Our difficulties in assessing VC 'private' performance reflect those raised in the literature (Gompers & Lerner 1999 op cit; Gompers & Lerner 1997, Mason & Harrison 2002; and Murray 1999).

VC even if it has a high ROR due to high monitoring and transactions costs; 3) Contribution to the **critical mass** of the industry—argued by A&T (2002c op. cit) as being an important factor in the cumulative processes leading to 'industry emergence'. Absolute output measures are also an indication of capabilities whereas ROR could be highly affected by 'luck' (e.g. one good exit in a small fund may cause a very high ROR). This means that a full study of the social impact of VCs should consider both *direct & indirect* impacts; and both *relative & absolute measures*.

To summarize the measures for each VC Company and/or each specific Fund, which we focus on here, are--

***Absolute Indicators:*** i) Number of Exits relative to the Date of VC foundation (or initiation of specific Fund); ii) IPO/M&A ratio—a measure of Structure of Exits & iii) Total VC Capital Raised;

***Relative Indicators:*** I) *Success Ratio:* Number of Exits divided by Number of Portfolio Companies (or Investments); & ii) Success Ratio modified according to Date of VC foundation (or specific Fund initiation);

***Indicators of Indirect Effects & Spillovers or Externalities:*** I) Total Capital under Management (for Critical Mass Effects); ii) Best Exits (for Reputation); iii) Whether or not Reputable Financial/Institutional Investors and/or Strategic Partners invested in the VC company (Networking & Reputation); iv) VC Pioneering (introducing *variety* into the system) and v) Demonstration Effects.

The above indicators will be generated for VC *Companies* and then averaged to obtain an overall index of private VC performance (Pp) and an overall index of VC social impact (Ps). For (13) VC companies these are classified in one of the following categories or levels of strength- ***Very Successful (VS), Moderately Successful Plus(MSP), Moderately Successful(MS) and Less Successful (LS)***<sup>20</sup>.

### 2.5.2 Pp levels and Pp-Ps Correlation

We now focus on the pattern of Pp and Ps during the pre –emergence (1989-92) and early emergence (1993-8) periods of Israel's VC industry. (3) VCs in our sample were founded during the pre-emergence period; and (6) during the early-emergence period (1993-5).

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20 Due to the short time of VC operation, the remaining 4 VCs were classified in an 'Other' category.

*All three VCs during pre-emergence have 'high' Pp indices (either VS or MSP); and two also have 'high' Ps (the last one have MS Ps). Thus the performance/impact of VCs founded during this period (they comprise most of the firms and all of the leading ones) is consistent a) with the existence of advantages of early entry into the VC industry; & b) with the view that early entrants to a successful new industry blaze the trail for subsequent entrants. The important point here is that companies showing high private performance also generated strong social impacts benefiting VC & high tech in the future. A rather similar though not so overwhelming picture exists for those VC who were founded during the early "emergence phase" (1993-5). Out of (6) such companies, (4) show both 'high' private performance **and** 'high social impact (Pp, Ps are either VS or MSP). In (2) others the Ps indices are MS (one with Pp indicator of MS and one with LS).*

The high Pp & Ps indices and strong correlation among them is particularly surprising during *Pre-Emergence*. As mentioned, while high Ps might be the expected outcome of early VC activity e.g. to generate a 'dynamic' stimulating subsequent emergence -there still is no assurance that Pp would be positive and high in VCs founded at such an early stage. This is *only partly* a result of the sample<sup>21</sup>. Similarly during *Emergence*, the dominance of VCs with high private and social performance is not something we could have anticipated since many firms with positive social impacts could as easily have registered weak private performance (in such a case government incentives would be responsible for positive *accounting* VC profitability, and hence, for entry).

The upshot of all of this is further reinforcement of our hypothesis in A&T (2002b) concerning the importance of favorable Background events & processes such as a pre-existing high tech sector with strong innovation capabilities and the beginnings of links with the US industry & market (see above). We may say that *the most important VCs already active during the pre-emergence period or having been founded during this period when Yozma incentives were not yet available- were already making profits then or would become highly profitable companies. These firms also had a strong 'social impact' (high Ps). This conclusion also roughly holds for the major VCs founded during the 'early emergence'.*

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<sup>21</sup> See A & T 2002c op. cit Moreover, our analysis is much less dependent on being based on a 'representative' sample of companies than being dependent on including a group of 'leading VCs' in both the pre-emergence and 'early emergence' phases. Note that the leader VCs were mostly companies with Yozma Funds which also underscores the importance of this program.

### 2.5.3 Implications for the Impact of Yozma

The 'high' Pp & Pp-Ps correlation found in at least an important group of leading VC companies founded during VC pre- & early emergence also reinforces our view of the strong impact of Yozma. This because most of these were linked to the program; and because there are ample reasons for our belief that this link positively influenced the indices. Out of 13 VCs, 8 had 'Yozma' funds. Out of these, 6 showed 'high' Pp levels (three VS and three MSP) with 5 of these also showing high Ps levels (three VS and two MSP). Only 3 of the 9 VCs with 'high Pp' ('high Ps') were not related to Yozma. Moreover, **all** VCs showing both high Pp and full Pp-Ps correlation (5 VC companies) were associated with Yozma<sup>22</sup>. The only Yozma VC without a positive Ps- Pp correlation was established towards the end of the VC emergence period (it had a high Pp but a low Ps).

### **3. A Conceptual Framework for Evaluating VC Policies-I**

The conceptual framework & methodology for evaluating VC policies of other countries is based on a Systems of Innovation & Evolutionary perspective. On the 'positive' side it is based on a classification of phases-- 'background conditions' phase, pre-emergence and VC emergence phases—and on various co-evolutionary processes. On the normative side it is based on a typology of policies which will enable both intra-country and cross-country comparisons.

In applying the above perspective we envisage a number of steps: **First--** *establishing whether VC emergence took place*; **Second--** *Critical Events & Processes which favored VC Emergence or which blocked it (The 'Context')*; **Third--** *whether the implementation of VC-directed policies was central (this would include an assessment about the impact of VC).*

#### **3.1 Defining VC Emergence & Characterizing its 'Context'**

*VC emergence is a process* rather than a state of affairs at a moment of time. It is characterized by a) a high rate of entry of new VC companies & a high rate of growth of VC activity; and, in response to attainment of 'critical mass, b) the onset of a Cumulative Process of growth with positive feedback effects. It converges into a state of *VC industry Consolidation*. During Emergence a lot of experimentation,

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<sup>22</sup> This means that although there were three non-Yozma VCs with high Pp and another three with high Ps, no non-Yozma VC had both a high Pp and a high Ps. This attests to the role of Yozma in inducing professional teams to enter the VC industry as well as signaling to foreign partners about the quality of their local (Yozma VCs managers) partners.

collective & interactive learning takes place both with respect to VC strategies & procedures and with respect to VC organization. Many strategies, procedures and organizational forms do not survive, some do and are adopted by varying numbers of VCs. However, their distribution is not 'stable'. During Emergence VCs also learn & collaborate with each other no less than compete with each other.<sup>23</sup> The VC industry also begins experimenting with 'institutions' and with various configurations of Supporting Structures. The period during which *Emergence* takes place includes but goes beyond the PLC *fluid* phase (Abernathy & Utterback 1978) when significant evolutionary *variation* takes place. It also includes part or all of the intermediate *growth phase* where evolutionary *selection & reproduction* operate. With VC industry *Consolidation* the industry attains a size which enabled it to sustain a large number of supporting services. It also converges to a relatively stable distribution of strategies, procedures and aspects of organization (in Israel, with a strong focus on 'early phase' investment)- a lot of whom are 'embedded' in 'routines' (Nelson & Winter 1982, Chapter 5)<sup>24</sup>. Moreover, the Supporting Structure and set of institutions are relatively well established (e.g. IVA). At this stage (which would correspond to *maturity* in the PLC) & for as long as external conditions remain unchanged the VC industry, and the wider hi tech cluster to which it belongs, effectively support the creation and growth of large numbers of new SU<sup>25</sup>.

To determine whether VC emergence took place or not we rely on country studies of VC Industry/Policies made by country specialists<sup>26</sup>.

### *The Context of Emergence or non-Emergence*

It comprises a set of *critical events & processes* which operate during one or more of the three phases identified above. These events and processes will be identified and their contribution to VC emergence (or non-emergence) assessed. The latter requires ascertaining the operation of *co-evolutionary processes* ( see 3.3 below) and adopting an *Infant Industry Perspective* (see next section).

It is clear that there is no unique set of critical events and processes required for successful VC emergence in all circumstances. In fact different authors (Florida, Kenney, Saxenian) have emphasized somewhat different sets of variables. Our

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23 This is a feature of young markets. VC cooperation can take various forms e.g. 'referrals', syndication, etc. In Israel part of the informal cooperation (and maybe some of the formal one as well) take place through the auspices or activities of Yozma.

24 Including 'change routines'

25 According to Saxenian op.cit this is an important feature of successful hi tech clusters.

26 We are more than aware of the limitations facing attempts by outsiders to evaluate a country's ITP.

research on the Israeli case suggests one such set. The main variables recorded there were: size, structure & achievements of the IT industry prior to and during emergence; scope of innovation capabilities accumulated prior to emergence; links & networks with world industry, product markets and capital markets prior to and during emergence; numbers of SU, early VC activity and VC organizational forms; strengths of Universities & other non-market organizations involved in research and training; incentives programs and institutional changes; etc (see A&T op. cit. and Section 1.2 above).

It is clear to us however that only *comparative research* will eventually be able to identify alternative sets of critical events/processes ('contexts') which might promote VC emergence in different types of countries & historical periods/circumstances. For the time being and given our limited knowledge we could at most strive to identify *some contexts* which have clearly been favorable to VC emergence in some countries/historical periods and other contexts which clearly have not been favorable.

### **3.2 Characteristics & Impact of VC-directed Policies**

The VC literature has yet to deal systematically with the role of VC-directed policies on VC emergence (like in the previous subsection, this also will require comparative research) so it should not be surprising if we don't have a clear methodology to deal with this issue.

Our starting point is the *identification* (albeit limited) of 'contexts' which have been clearly favorable to VC emergence in certain countries/circumstances and of other contexts which have clearly not been so. A detailed analysis of these extreme cases-such as that conducted in the Israeli case- might suggest hypotheses about the role of VC-directed policies (or their absence) in the successful and failed VC cases. These would be supported by data and by Appreciative Theory (Nelson 1995) such as the *Infant Industry Perspective* of the next section. The outcome, while not definitive (since this also would need further comparative research), might still be as robust as one can expect at this stage in the research.

Comparative research on the role of VC-directed policies on VC emergence should take into account 'normative' Systems/Evolutionary principles. The first point is the importance of comparing the *policy portfolio* at each phase with what could be

visualized as an *appropriate policy portfolio*.<sup>27</sup> The sets of policies considered could be more or less comprehensive and this may have implications for the type of conclusion arrived at and for its precision. Only rarely will it be justified to focus on targeted VC policies one at a time without considering other VC-directed policies and ‘complementary’ policies (not aimed directly at VC but still having considerable influence). Complementary policies for example could take care of the ‘demand side’ for VC (e.g. in Israel, the Technology Incubators & the R&D Grants programs); or through policy experimentation and learning could improve the policy options for the future.<sup>28</sup>

The second point concerns the *classification of policies and programs*. This should be based on a number of criteria: a) *policy objectives* (e.g. whether to spur VC emergence e.g. Yozma, or only to create suitable background conditions e.g. India’s policies in the late 80s); b) distinguishing incentives/incentives’ programs from *institutional changes* (e.g. deregulation of VC activity & liberalization of the stock market in India in the 90s); c) *types of incentives* (neutral or selective-targeted; supply, demand or other; to the ‘downside’ or the ‘upside’ etc; and d) a *functional focus* e.g. only R&D or alternatively, both R&D and other factors such as organization, management and marketing. These distinctions are crucial in order to analyze a country’s VC policies through time and for comparing across countries.

### **3.3 Assembling Co-Evolutionary Processes: Policy-Business Sector Co-Evolution**

The next phase in the assessment of VC policies is to build co-evolutionary sequences involving subsets of the ‘positive’ and ‘normative’ variables suggested above. Different patterns of co-evolution (including ‘trunkated co-evolution’ or vicious rather and virtuous cycles) would emerge for different countries. This would permit to pinpoint with higher accuracy the role of VC policies in the process.

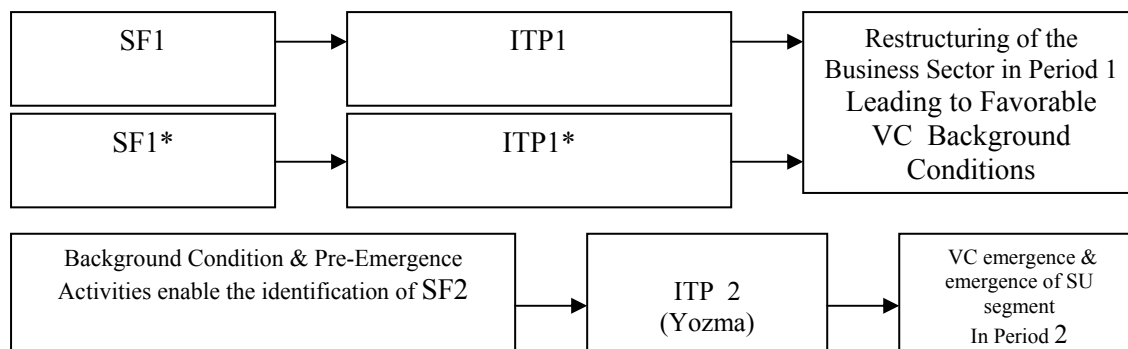
For Israel we have already shown that ‘industry level data’ is consistent with a VC-SU co-evolutionary story which spans the pre-emergence (1989-92) and VC emergence (1993-98) periods (see A&T 2002b,c). Here we add the outline of a broader *business sector-policy co-evolutionary process* which also includes the earlier phase where the ‘background conditions’ for VC emergence were created.

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<sup>27</sup> Due to fundamental uncertainty, lack of data and incomplete information about the basic contours of ‘reality’ it doesn’t make sense here to talk of an ‘optimum’ policy portfolio. See Teubal 2002a.

<sup>28</sup> Comparing VC policy portfolios across phases or through time (e.g. the Inbal program of 1992 with Yozma of 1993) would also be important to understand how policy experimentation and learning might have influenced the impact of VC-directed policies.

**Figure 1: ITP-Business Sector Co-evolution: the case of Israel**



*SF 1*: absence of R&D performing firms and of innovation capabilities in the late 60s-early 70s;

*SF1\** (a second System Failure of Period 1) - during 70s & 80s, absence of capabilities & links/alliances with foreign companies to penetrate global technology markets (mostly US).

*ITP 1*– creation of the OCS and implementation of the 'Backbone, Horizontal R&D Grants Scheme' during the 70s and 80s;

*ITP1\**– complementary policies supporting cooperative R&D programs involving an Israeli and a US company (BIRD-F Program 1977- )<sup>29</sup>

*Restructuring of the Business Sector in period 1*: Emergence during the 80s of a large segment of R&D performing companies mostly in Electronics; widespread diffusion of Innovation Capabilities throughout the business sector; and enhanced links and alliances with US firms; acquisition of global marketing capabilities; & cultural changes favoring entrepreneurship.

*SF2*, the above changes in the business sector and other changes in the environment—including the globalization of capital markets for technology firms- created an opportunity in the early 90s for a new high tech SU segment directed not only to product markets but also to global capital markets. For this to happen a new type of financing organization—VC—was required for the business sector.

*ITP 2*- the targeted, VC industry directed program Yozma, implemented during 1993-8, which led to *Emergence of the VC industry* and of a *new SU segment of high tech*.

<sup>29</sup> Israel's small market disadvantage, by forcing it very early to forge links with the US, indirectly contributed to generate a competitive advantage in high tech during the 90s. This conforms with Porter's analysis (Porter 1990) where action and creativity caused by a competitive disadvantage can generate forces leading to a competitive advantage.

Israel's policy-business sector co-evolutionary story shows that VC-directed policies and the emergence of VC are the *outcome of an evolutionary process*, which in Israel started more than 20 years before those events. Moreover the OCS-the ITP institution- played the central role both as the implementation agency for the 'backbone', horizontal, business sector R&D Grants scheme implemented since 1969; & as the initiator of the policy process leading to Yozma. This means that the two-period virtuous co-evolutionary process owed a lot to the decision during the second half of the 60s to create the OCS (absence this Agency there might not have been a link between Period 1-70s/80s- and Period 2- 90s). Finally note that at each period *it is not a market failure that supports Government intervention but a System Failure* (Metcalf 1996, K. Smith 1991, OECD, Teubal 1998). Not only underinvestment of market forces 'causes' the lack of innovation capabilities in period 1 and the absence of a VC industry in period 2, but insufficient changes in institutions & even 'culture'. Changes in institutions involve areas such as liberalization & de-regulation, corporate law, governance of universities, intellectual property; bankruptcy laws, geopolitical links with global market core countries, a changed attitude towards entrepreneurship; a new disposition towards outsourcing, outside links with other companies & cooperation in R&D/Innovation, etc.

#### **4. The Conceptual Framework-II: An Infant Industry Perspective**<sup>30</sup>

##### ***4.1 Class A and Class B industries***

Our analysis of patterns of private profitability and social impact of VC firms at the early phase of Israel's VC industry suggests that there are two extreme situations for Infant Industries in industrializing or Peripheral Economies<sup>31</sup>. We term these Class A and Class B. Class A is characterized by the pattern we found in Israel's VC industry, namely a situation where leading firms (or an important segment of such firms) during the early phases of the industry were both privately profitable **and** strong contributors to the future growth of the industry through externalities, reputation effect, networking effects and other factors (*high VC social impact*). In Class B industries on the other hand leading companies in the early phase of the

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30 This section relies heavily on A & T 2002c

31 The notion of Infant Industry assumes a country which is not that in which the industry first appeared. Thus Venture Capital was not an infant industry in the US but it was so in Europe and in industrializing & peripheral countries such as Israel, Taiwan and India. Thus the notion should not be circumscribed to the latter category of countries.

industry who had a strong social impact (i.e which benefited other firms and the future growth of the industry) were not privately profitable. Class B industries are those predicted by a simple 'neoclassical' market failure perspective (Arrow op. cit) as applied to new industries. Arrow referred to R&D performing agents who, due to the inevitable externalities generated from such activity (*'high social impact'*), would suffer negative profits (*low private performance*). Due to the high levels of uncertainty and risk in the early phase of an industry a similar situation would frequently characterize "new" industries<sup>32</sup>. The role of Government in that context would be to provide compensatory incentives to agents for their loss making, 'externalities-generating' activities.

We postulate that Israel's VC industry in 1993 was Class A; and that this was one of its *distinctive features*. It partly explains Yozma's success. Note that Class A industries might have evolved 'naturally' without targeted policies. With respect to Israel's VC industry, the issue to be asked is whether the effective co-evolutionary and cumulative processes analyzed in previous work (& indicated above) *were dependent* on a targeted program like Yozma. Being a Class A industry & other factors also explain *the high rate of growth of Israel's VC industry during (early) Emergence*. The whole process took about six years: three years where favorable 'pre-emergence conditions' were created; and three additional years of policy-driven 'early VC Emergence'.<sup>33</sup>

#### ***4.2 Class A Industries—A" Policy—Market Forces Paradox"?***

This case suggests a possible 'Policy Paradox' or a 'Policy-Market Forces' Paradox: while capable, flexible market forces seem to be required for the successful implementation of a *targeted program* directed to an infant industry (Israel's VC industry in this case); a strong business sector with those qualities would eliminate the need for such policy in the first place. Our presumption, however, is that the above 'Policy-Market Forces' paradox could be more apparent than real. This is because *up to a point, rather than substituting for policy, stronger & more capable market forces may require complementary targeted ITP (or targeted complementary industrial*

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32 In "new" industries we expect a high rate of firm entry and a high rate of firm failure/exit as the new opportunities are being tested and experimented with. See Abernathy & Utterback 1977; and Klepper 1996. This is consistent with a subgroup of companies having among themselves a negative Pp & a negative Pp-Ps correlation in the early phase (or a stronger such pattern relative to what we would expect in the mature/rigid phase) e.g. loss making firms generating a strong process of collective learning.

33 The failure of the Inbal Program which began operating one year before Yozma strengthens our argument that Yozma was critical for the emergence of Israel's VC industry

*policy) for their industry-generating potential to be materialized(e.g. to assure rapid attainment of critical mass).*

If a country has a strategic priority in a Class B industry there are strong reasons of principle supporting the view that it may have to implement a *targeted ITP/industrial policy program directed to the industry*. However, 'weakness of market forces' e.g. from unfavorable background conditions and policies- would also imply that *a high share of such Infant Industry Support would fail*<sup>34</sup>. On the other hand, if a country has a strategic priority in Class A industries Infant Industry support may or may not be required since in some cases the industry may emerge satisfactorily even without Government support. Were such support justified the existence of relatively well developed market forces will assure a high probability of success in implementation of a targeted program<sup>35</sup>

#### *Yozma's Success: Accelerating or Causing VC Emergence?*

To further clarify the terms of the 'paradox' let us note: *First*, Market Forces with strong capabilities could have been *necessary but not sufficient* to propel high tech to its new 'Silicon Valley' configuration (including 'emergence of VC')-additional capabilities would be required and these need not automatically be generated to the extent &/or the speed required; *Second*, *either Yozma caused emergence*; or it only *accelerated* what market forces would have accomplished anyway. Which of the two possibilities is the correct one cannot be solved here. It would require a study of the complex process of VC emergence for which there is neither satisfactory conceptual framework developed from the study of other industries nor an adequate empirical basis. *However, in our opinion Yozma was a successful policy under either one of these situations*. Even if it only accelerated 'emergence' the economic value of the resulting high tech transformation would have increased considerably. Due to static economies of scale (which may create both low level and high level 'equilibrium');

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34 Bell (1982) has effectively surveyed the success of a number of infant industries in developing countries during the post-war period till the late 70s and reached a conclusion that only in a minority of cases was infant industry support successful. This would correspond to Class A were the relevant market forces were highly underdeveloped. One possible exception was support of the steel industry in Brazil (see Dahlman's study of Usiminas in Dahlman, et al 1987). Implicitly this study emphasizes the importance of ITP and other policies generating company capabilities for success in Infant Industry Development. A similar picture emerges from OECD reports on VC policies during the 80s and early 90s. They had very little impact on VC and on high tech (see Literature Survey in Section 3 above); and they are reasons to believe that the state of affairs concerning VC would correspond to that of Class B industries (e.g. due to unfavorable background conditions).

35 Possible examples of Class A industries would be the automobile & steel industries of Japan which received targeted support during the postwar reconstruction period; and a number of mid & high tech industries of Korea and Taiwan during the 70s & 80s. Note that Japan had well developed steel and automobile industries before WWII i.e. well developed market forces. See also C. Johnson 1982 where it is surmised that targeted infant industry policies succeeded in Japan since they accelerate a type of structural change which market forces by themselves would have implemented albeit more slowly. Having said this it should also be noted that in some cases Government promotion of Class A industries may have a negative effect.

dynamic economies involving externalities & spillovers flowing from learning, reputation effects, networking and other factors—which would better articulate Israel's competitive advantage; and the short window of opportunity before the collapse of NASDAQ- unaided market forces might have underperformed compared to a Yozma-driven process. In all likelihood they would have created a smaller VC sector, and an associated shorter period of expansion and growth of high tech & the economy as a whole.

#### ***4.3 Additional Reasons for Yozma: Reputation and other VC industry Specific Aspects***

Most of the above factors supporting the likelihood of underperformance by un-aided market forces in Israel's VC industry in 1993 might also be present in other Class A industries as well. But there are *strong additional reasons* for such a presumption in our case. *A closer look at the idiosyncratic aspects of the VC industry will show that Yozma was necessary for Emergence (rather than only enhancing its economic value).* Once the key background capabilities & other factors were in place the critical input for VC industry emergence was availability of capital, particularly intelligent capital from reputable and experienced financial institutions abroad. It has been stated during our interviews that *the fact that, through Yozma, the Government of Israel was willing to invest directly and indirectly in SU<sup>36</sup> was an important profitability confidence signal to such investors.*<sup>37</sup> A second no less important reason relates more directly to the cumulative process generated during Phase 1: *a seemingly necessary condition for the first VC funds created under the auspices of Yozma to trigger entry of subsequent funds is that the former be highly profitable.* Note that Yozma's design enabled Yozma funds to be highly profitable in the upside<sup>38</sup>. This created a strong VC ***Reputation*** followed by significant expansion and new entry. Strong early profitability was due to very good exits from early investments; and this led immediately to Venture Capitalists worldwide and to business agents domestically to consider investing in Israeli VCs & to cooperate with them, hence the onset of cumulativeness. By the same token, early funds and early investments which are not

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36 Directly since a portion of the Yozma Program budget (20M\$) was earmarked for direct investment in SU through the Yozma Fund

37 Lerner 1999 in his study of the US SBIR program (which supported Government –related VC activities) found a similar phenomenon-SU backed by this program had superior performance mostly due to the signaling effect which favored such companies.

38 In fact Yozma's design created additional incentives to VCs to select and groom very good SU over and beyond what the market or an outright subsidy (or Government Guarantee) would give.

*highly profitable* risk truncating the subsequent process of VC industry emergence (see below)<sup>39</sup>. Avnimelech 2002 takes the "Reputation leads to Capital leads to Added Value" argument further and argues that, through a path dependent process, initial success/reputation may generate a national, sustainable competitive advantage in the VC industry.

A final point concerning the impact of targeted policy on Class A industries is the inducement given to VCs to *continue operating* according to a 'strict definition of Venture Capital' even after 'emergence'. In the absence of such support a VC industry might evolve into a Private Equity industry. This may have occurred in some European countries e.g. Italy and possibly Sweden in the mid-80s.

This links with a number of research results from the VC literature. For example, Gompers 1996 shows that young VCs (compared to well-established ones) tend to push portfolio companies to an 'early' IPO in order to generate cash and reputation for follow up funds. The reputation generated is important to attract new outside investors; and it is higher, among other factors, the younger the company at IPO. He also finds that young VCs with a low performance in their first fund don't succeed in generating additional funds (in contrast to mature VCs who even in the aftermath of a fund's low performance succeed in raising additional capital). The high Pp of early VCs in Israel fits perfectly into this model: they were young companies, and they had fast and very profitable exits of young portfolio SU. This led very fast to follow up funds (sometimes after 2-3 years). In addition, and going beyond Gompers's analysis, *the Israeli experience shows that, because several Yozma funds had such high returns early, the individual reputation effects spilled over to the VC industry/high tech cluster as a whole (or coalesced into a strong reputation for the industry as a whole); and that this led not only to expansion (i.e. follow up funds) of existing VCs but also to entry of new VCs*<sup>40</sup>.

We conclude that special characteristics of the VC industry reinforces our conclusion that there was no 'Policy-Market Forces Paradox' with respect to the emergence of Israel's VC industry (even being as it was a Class A industry). Despite

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39 The Reputation effect would lock –in VC into a low level 'equilibrium' trap.

40 Subsequent reputation of the VC industry would have also been sustained by higher VC age and larger VC size (Gompers & Lerner 1999 op. cit). Note that VC reputation not only enhances the possibility of raising capital but also the possibility of leading SU to a successful IPO.

very favorable conditions as far as 'market forces operating or intending to operate in the area' is concerned, Yozma played a critical role in the creation of the industry<sup>41</sup>.

## **5.Preliminary Evaluation of Country VC Policy:US & India**

We attempt here to apply the VC Policy Evaluation Framework whose main components were presented above in Section 1.2 We start with the US-the country who Invented Venture Capital

### ***5.1 Evolution of the US Venture Capital industry<sup>42</sup>***

#### **Background**

Entrepreneurial finance has a lengthy history in the US going back to financing railroad in the 1800s, and later on in the Industrial revolution. The US had & still has strong S&T capabilities (High R&D expenditure, world-leading academic institutions, high rate of science and engineers and high rate patents). Since the 1950's the high-tech clusters of Silicon Valley and Route 128 became world famous and were dominant in all technology revolution and leaders of the IT US revolution of the 1990s. For Decades the US government implemented a variety of incentives' programs (including public support of R&D expenditures) to stimulate innovation in SMEs e.g. Lerner (1999) indicates 27 US government programs directed to simulating VC or/and SU activity. It has also systematically used taxation and institutional changes (e.g. regulation of pension funds).

#### **The Concept of Venture Capital**

Apparently, the term "venture capital" was first used in a public forum by Jean Witter to address to the 1939 Investment Bankers Association of America. Through the 1930s-50s there was concern & intensive discussions in both the US & the UK about the lack of investment in small businesses although there was little agreement about what types of small businesses should receive funding and what were the proper vehicles for providing finance. This increased awareness about the importance and

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<sup>41</sup> Our view of the role of Yozma in enabling a stronger VC industry reputation than what would be the case without a suitable targeted Government Program is consistent with Shertler's view (Shertler 2002) that the VC industry is characterized by strong path dependencies. More specifically, initial reputation stimulates experience (presumably through amounts of capital raised and invested, quality of investments, etc) which in turn improves performance and further reputation. In our view this is probably one of the central 'elementary dynamic processes' which operated in Israel during the VC emergence and beyond.

<sup>42</sup> The following is based on accounts of Gilson, R 2002:"Engineering a Venture Capital Market: Lessons from the American Experience"; M. Kenney 2001:"Regional Clusters, Venture Capital and Entrepreneurship: What can the Social Sciences Tell Us about Silicon Valley", forthcoming in a OECD Workshop Proceedings; and others. The notions of background conditions, pre-emergence and emergence used below come from our analysis of Israel's VC industry (A&T 2002b).

special needs of SMEs led to the SBIC (Small Business Investment Company) Act (see below). In the 60s and as a result of the implementation of the SBIC program the term VC evolved to describe a specific form of financing small privately owned firms with potential for fast growth.

After the uncovering of problems with the SBIC program, the new regulation regarding pension funds (Prudent Man Rule of 1978) and regarding the operation of Government Agencies (from SBIC & SBIR Acts of 1982) led to a more specific categorization of the type of SME to be supported. The VC concept referred to investments in early stage, innovative SMEs. Eventually during the VC industry consolidation period (late 70s and 80s) the concept referred to equity investments, usually by LP VCs, in innovative (high tech) startups. It excluded buyouts, non high tech investments, later phase high tech investments and loans & other non-equity finance (equity investments implicitly include the finance of non R&D activities of such SU as well as their R&D activities). This strict definition of VC is, appropriately so, used in the US today.

#### *Pre-emergence and VC industry Emergence*

In the US & prior to World War II there were wealthy families who invested in new promising firms. Shortly after the War, some of these began hiring professional managers to discover, evaluate, and invest in small firms with high growth potential. These were the first family VC funds. In 1946 the first formal US VC fund (ARD) was founded in Boston by a Harvard professor and by the president of the Boston Fed. ARD defined many of the practices of VC investing. A handful of other VC funds were subsequently established in the decade that followed. Most of them were publicly held close-end funds.

In 1954 the Small Business Administration was created in order to improve the government's ability to promote formation and success of small businesses and in 1958 the SBIC Act was published. The SBIC Act allows private investment companies that invest in startup companies to receive loans in preferred terms. This was probably the most important VC-directed (or proto-VC directed) incentives' program in the US. During the late 1950's and 1960's SBICs VC firms took the lead from the publicly traded close-end VC funds and dominated the VC industry. By 1965, they controlled nearly all venture capital investment in the US. In this they were

avored by the hot IPO market at the time which allowed VC firms to demonstrate their ability to select and add value to startup firms.

The glorious period for SBIC's ended abruptly during the late 1960's when government intervention, spurred by fraudulent behaviors on the part of many SBICs, forced a nearly 2/3 reduction in their number. This was the outcome of ERISA (Employment Retirement Income Security Act) of 1974 which made pension fund managers criminally liable for losses incurred in high risk investments(interpreted to include venture capital investments). As a result Pension Funds shunned VC a fact which almost destroyed the industry<sup>43</sup>. This act and the downturn in stock markets caused a sharp decrease in VC fundraising and investments.

In retrospect VC industry Consolidation took place approximately through 1978-1984 with VC industry Emergence occurring about 10 years earlier. Emergence would be characterized by a high rate of entry of new companies & a high rate of growth of activities –both spurred by a self-reinforcing process which would, in addition, lead in a relatively short time to VC consolidation<sup>44</sup>. These processes were caused by a number of reasons: first, the reduction in profits of traditional industries compared with the high returns offered by new technology sectors such as semiconductors (including several SU success stories). Second, the “escalating” stock market activities in the 1970's and 1980's, which made it easier to issue new companies. Third, a series of changes in public policy—most notably reductions in the rate of taxation on capital gains (Revenues Act of 1978 and Tax Recovery Act of 1981-- reduce capital gain tax from 49.5% in 1977 to 20% 1981), allowing pension funds to invest in VC<sup>45</sup> ("Prudent man" rule of 1978)<sup>46</sup> and adjustment of the regulation/environment to the needs of the VC industry. And finally, the Small Business Innovation Development Act of 1982 (SBIR program- government VC fund investing in seed R&D of SMEs) which solved the system failure in seed capital.

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43 See Dossani & Kenney 2002, p 231

44 'VC Industry Consolidation' means something more than the agglomeration of a number of companies comprising an 'industry'. In industries of the type considered here, consolidation must involve a) a critical mass of companies focused on a relatively well defined product or service area which can support production of a sufficient variety of non-traded or semi-non-traded intermediate goods and services b) a relatively stable set of company organizational forms, c) a minimum of institutions and supporting structures. In many industries consolidation can only be the outcome of an evolutionary learning process which helps define modes of operation, organization and institutions. Moreover these features must have a measure of permanence or sustainability; and should be the basis upon which future growth takes place. See A & T 2002b.

45 The same percentage (5%) as before 1974 was allowed to be invested by Pension Funds in VCs but the stricter definition assured that the capital will reach early phase innovative SU.

46 Dossani & Kenney 2002 mention that the National VC association began an active lobbying process in 1973; & that only in 1982 did they complete the process of gradual loosening of pension fund regulations. Moreover, 'the reinterpretation of these pension funds guidelines contributed to a flood of money into new capital funds'.

The most striking feature during and after VC emergence was the dramatic growth of the limited partnership form as the primary vehicle of VC firms. The LP form first introduced in 1958 but its share wasn't significant until the mid 1970's. Since then it grew rapidly reaching 35% in 1977, 70% in 1987 and about 80% in the mid-late 1990's<sup>47</sup>. Other VC forms acting today are 1) VC affiliated to industrial corporations (CVC), or to financial institutions, 2) VC related to the government (SBIC, MESBIC and SBIR), 3) Publicly traded VC firms.

It is noteworthy to mention that Government support to the VC industry did not end with consolidation of the industry. Both the STTR Act 1992-whose purpose was to stimulate technology transfer between the universities and industry through awards to technology projects performed jointly by small businesses & universities; & especially the SBIC Act of 1992- allowing SBICs to organize themselves as LPs- led to significant additions to VC funding in the early 90s<sup>48</sup>. This presumably enabled the VC industry to exploit the full potential of the technological revolution of the 90s.

### Summary

The Venture Capital firm is a US organizational innovation whose roots can be traced back to the 1930s. Since the 1940's there has been significant institutional and practical experimentations seeking the best format to support venture investment. The institution became formalized in the 1960's although several organizational formats co-existed then (with a ranking not yet reflecting what would become the dominant form). In fact the most frequent organizational form 'selected' during VC emergence & consolidation was the Limited Partnership VC company (LP) rather than a SBIC or a public VC company. During this period a number of practices or institutions of the industry became stabilized.

A VC industry can thrive on a sustainable basis only if new scientific-technological based innovation & business opportunities are continuously being created in the System (Kenney op. cit, Dossani & Kenney op. cit). It is no surprise then that VC backed startups were involved in the establishment of entirely new industries such as Semiconductors, Biotechnology, and Internet. This explains why the VC industry had

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<sup>47</sup> The Government at this time recognized the importance of the LP form of organization and this is reflected in the 1992 addition to the SBIC Act which allows such companies to adopt an LP form where the Government would act as an additional Limited Partner (each \$ by the other limited partners would leverage up to 2-3\$ Government investment). Between 1994-1996 71 new SBICs with 945 M\$ in private equity which amounted to more than SBIC private capital raised in the preceding 15 years (OECD 1997). This success emphasizes the importance of arriving at a successful design of VC which a Government-VC directed support program could select.

<sup>48</sup> This support continued throughout the 90s. It reached 2.5 B\$ in 2001.

such a great impact on US economic growth and why it should be seen as an important part of the US national system of innovation (it facilitates the introduction and diffusion of radical, generic technologies). Although, to some extent at least, the VC industry in the US emerged in an autonomous fashion the role of government was crucial both prior to emergence and even after. Policies played very significant roles in accelerating learning and in adjusting the business environment to accelerate and strengthen VC-SU co-evolution (presumably a major aspect of emergence, see Dossani & Kenney op. cit). They affected both the timing and the strength of the VC emergence & consolidation processes. Federal policies adopted included-- providing capital & stimulating VC manager learning through SBICs in the pre-emergence & emergence phases, capital gain tax reductions, pension funds liberalization, LP regulations, and involvement in the seed gap through the SBIRs. Moreover, it seems that the US government reacts counter-cyclically to changes in the VC environment by strengthening the industry during downturns (The VC industry is known as very cyclical, and largely governed by the receptivity of the stock market to new stock offerings).

## ***6.2 Evaluating US VC policies***

### ***Pre-Emergence & Emergence***

VC-related policies in the US seem to have played extremely important proactive roles in creating favorable background (pre-emergence) conditions for VC industry emergence during the late sixties. First and foremost is the SBIC program which contributed enormously to expand VC activity and through this generate a significant market experimentation & learning processes by both market agents and policy makers (this process was also favored by the ample opportunities which the variety of conditions prevailing in the US offered). In this respect Dossani & Kenney 2002 mention that VC capitalists emerged from some SBIC through two processes: first, formalization of proto-VC activities; second, successful leverage of personal capital → successful investments → reimbursement to program + leverage of additional institutional capital → becoming formal Venture Capital companies. Kenney in a previous article states "By 1968 the SBIC format had become too constraining for these venture capitalists. For example in 1968 George Quist left the Bank of America's SBIC to join William Hambrecht in establishing Hambrecht & Quist, who became one of the premier high technology brokerage firms and served as the lead

agent in many Silicon Valley IPOs in the late 60s. Willian Bryan and William Edwards merged their two family SBICs into a limited partnership The others soon followed" (Kenney 2001, p.7). The above assured a successful metamorphosis of an SBIC-dominated industry into a LP dominated industry (primarily in Silicon Valley). Given such a favorable background and the simultaneous appearance of a vast array of new technological and business opportunities during the 60s and 70s-VC emergence was to a large extent an endogenous process (self-emergence).

#### Consolidation (late 70s early 80s)

In contrast to its role during emergence, the role of Government here was that of an enabler or facilitator. Several specific or targeted policies were implemented: Pension fund regulation; Seed Capital (SBIR program) and reductions in Capital gain taxes. It seems that VC industry Consolidation might have occurred without these policies but chronologically at a later date.

#### Post Consolidation

The VC industry is a sustainable industry that is there to stay. However through continuous adjustments to changes in the environment the government helps to overcome temporary market failures & downturns (SBIC act & STTR of 1992, ext.)

Several types of learning processes were induced or facilitated by Government Policies These include

- R&D/Innovation learning by individuals and firms; and learning to structure and to operate high tech SU.
- Collective learning reinforcing VC-SU co-evolution e.g about how to provide incentives to entrepreneurs and mangers/engineers; norms and procedures governing VC-SU interaction (e.g. contracting); & better understanding of the operation of the new model of high tech (VC &SU intensive model, which developed in Silicon Valley). Other aspects are a) successful high tech entrepreneurs joining VC firms as general partners; and b) learning by lawyers, accountants and other agents related to VCs & SUs.
- Learning about VC organization, structure and contracts, whose phases include: a) individuals and families invest directly; b) they bring a professional manager; c) VC managers begin raising capital from outside sources through publicly traded close-

end funds or SBICs; d) stabilization on the Limited Partnership form of VC organization (with a new agent—gatekeepers). LP turned out to be the most suitable VC company structure –for tax, regulation, legal factors, flexibility reasons etc. It also enables the strongest possible link between VC performance and VC manager abilities on the one hand and VC reputation/compensation/fundraising on the other hand. All this led to the professionalizing the VC industry.

- Policy Experimentation & Learning: i) within the SBIC program to avoid corruption, reduction in guarantees; definition of SBICs focus from SMEs to innovative SMEs; and ii) within the SBIR—support of seed investments in innovation SME. Policy learning also underlies the shift from Horizontal or General Support to Targeted Support (limited to overcoming system failures or temporary biases from the equilibrium); and also the creation of a suitable environment (Taxes, pension funds regulation, corporate law, LP regulation, and exit).

### Summary

While there were VC activities prior to US Government intervention, it seems that one of the critical roles played by Government was to reduce the private cost of early entrants to the VC industry. This cost included an important aspect of individual and collective 'learning' (including educating the market). By compensating for this Government incentives' programs (particularly the SBIC program) generated much more entry, experimentation, learning & capacity to overcome crises/ mistakes than what would have been otherwise.

The above was critical for VC industry emergence—one characteristic being the onset of a positive, cumulative process of growth. Already then and towards the consolidation phase many VC who previously operating under the SBIC program set up privately owned, independent LP VC companies(the transition was made possible only after most of the social costs of learning had already been incurred through implementation of the SBIC program).

This is consistent with the view that the VC industry prior & during the SBIC program was Class A (as defined in Section 4) that is leading VC operations who contributed very early to such a learning process (i.e. had strong social impact) paid a high price in terms of reduced private profitability. Under these conditions,

Government policy was critical to leverage early VC activity and lead it towards 'true' Emergence of a stable, sustainable VC industry.

### ***6.3 Towards an Evaluation of India's VC-related policies<sup>49</sup>***

#### ***Background***

Prior to 1985 there were no VC firms in India. The context for their emergence was gradually being created as a result of both domestic conditions & developments and external events. An important first factor was the ideology & philosophy favoring SMEs as well as support to these firms since Independence. Even though SMEs were in traditional industries they did indicate a 'culture of private enterprise'. Moreover, educated classes improved their attitude towards high-tech entrepreneurship during the later 90s.

A second favorable condition was that by 1960s India had one of the most sophisticated stock markets in any developing country. This was important since the nationalized (since 1969) banking system that controlled the bulk of the country's resources didn't provide resources to SMEs or to entrepreneurial firms. Moreover, the stock market could be adapted to the floating of high tech startups thereby providing a context for *follow up finance*. This took place in 1991 when the newly created Securities & Exchange Board of India, as part of reforms and loosened regulations, removed the profitability criterion for the listing of a company<sup>50</sup>.

A third factor favorable to the creation of a VC industry was (and continues to be) the availability of ample numbers of excellent engineers, programmers and scientists willing to work at relatively low wages. This triggered emergence of India's software industry (see below) and attracted foreign engineering operations to India. Related to this was the appearance of a significant group of **Non Resident Indians (NRI)** who- in the 80s and even more so in the 90s-- emigrated to the US and became entrepreneurs with their own high tech companies. They were extremely successful and some became angels or VCs. Theirs is a potential role as 'transfer agents' of the Silicon Valley form of high-tech, particularly as VCs and VC-activity are concerned

#### ***Emergence of a Successful Software industry***

It must be recognized that a viable VC industry depends upon a continuing flow

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<sup>49</sup> Most of the factual material here and several of the ideas have come from the detailed and insightful article by Dossani and Kenney 2002. In what follows we will abstain from referring to this article in specific instances.

<sup>50</sup> The reforms introduced at the time led to an expansion by 50% in the number of listed companies (to almost 10,000) and to a daily turnover of 2.46B\$.

of investment opportunities capable of growing sufficiently rapidly to the point at which they can be sold yielding a significant annual return on investment. If such opportunities do not exist, and if SU companies are not created in sufficient numbers to exploit such opportunities, emergence of a VC industry is unlikely. The homegrown Indian software industry, which started in the 80s and became enormously successful in the 90s (& till 2001 at least) could play an important role in this respect. It could be the source of such 'continuous flow of investment opportunities' & of a lot of the entrepreneurial, managerial and engineering spin-offs and spillovers required exploiting them<sup>51</sup>

Major milestones in the evolution of India's software industry included-- a) IBM's retreat from India in 1978 which released 1200 software personnel some of whom established small software houses b) liberalization of the computer and software industries; c) Texas Instruments who in 1986 received government permission to establish a 100% owned software subsidiary in India (other foreign engineering operations followed); d) 'body shopping' in the 80s and the beginning of off-site contract programming (early 90s); and e) rapidly increasing value of some Indian Software/IT firms like WiPro & Infosys (Infosys who floated in Nasdaq and reached a value of 17 B\$ in 8-2000).

Having mentioned the strong points we should add that low value services still remain dominant in India's software industry. High value next stage businesses including turnkey projects, consultancy and transformational outsourcing make up the balance. Branded product development (or globally distributed packaged software) for the export market is still negligible (as is the hardware sector- despite recent successes such as Armedia , Ramp Networks, Saken and others).

### *Innovation and Technology Policy (ITP)*

Till the second half of the 80s the Indian Government's ITP focused on R&D performed by its own research institutes; on technology selection on behalf of industry; and on promoting technology self-reliance. In 1984 and in response to the failure of the Government-run computer firms and the success of private firms like Wipro (a conglomerate who established an IT spin-off business in Bangalore in

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51 Chesborough 1999 analyzes the 'incentives constraint' facing large high tech companies such as IBM, a constraint that led to spin-offs of top personnel (e.g. in the hard disk area) who founded new SU. Other work showed the importance of managerial & marketing spillovers from large, incumbent companies in Israel and elsewhere to smaller SU. See A & T 2002b,c; Teubal & Avnimelech 2002a,b and Bershnanan, Gambardella & Saxenian 2002 .

1981), HCL, Infosys (founded in 1981) & Tata Consultancy Services, the Indian Government began to liberalize the computer and software industries by encouraging exports. A targeted policy approach to the development of the software industry began. This was timely since there was a worldwide shortage of computer programmers. Sometime during the 80s, Bangalore had also been targeted by the Indian Government as the national center for high technology. The research activities of state owned firms in aeronautics, space research, and defense research were centralized there. Also India's best research university- Indian Institute of Science- was or became based in Bangalore

### First Period (1986-95) of Venture Capital in India

In 1988 for the first time a set of Guidelines were enacted for the operation of VC companies. Up to then the institutional-regulatory context was inimical to the implantation of VC organizations of the type prevailing in Silicon Valley & Israel. These guidelines in conjunction with **World Bank (WB)** supported Government Investments in selected VCs- constituted the beginning of policy in the area. Underlying the WB report of 1989 was a Government more open towards shifting decision making about choice of technologies to industry and more open towards the import of technology.

The guidelines aimed at allowing state-controlled banks to establish VC subsidiaries (formally it was possible for other investors to create a VC). While permitting the operation of VC companies they still implied a highly constrained and bureaucratically controlled Venture Capital operation. The WB's contribution was a 45 M\$ loan to the Government who would re-lend it at commercial rates to 4 public sector financial institutions for the purpose of permitting them to establish VC operations. The loan would be for 16 years—including a 7 year moratorium on interest and repayments. The VCs had to abide by a list of approved investment areas; & other bureaucratic features e.g. the Controller of Capital Issues (Ministry of Finance) had to approve every line of business in which a VC firm wished to invest

Of the four VC companies funded the most important and successful was TDICI -established in Bangalore in 1988. It emerged from a subsidiary of ICICI (the second industrial development bank in India—at the time state owned and managed) & became a 50/50 joint venture between ICICI and UTI-the state-run mutual fund. The primary reason for the joint venture with UTI was to use its *tax pass-through* which

was only available to this company by a special act of Parliament. TDICI's first fund – Vecaus 1--invested in several successful IT companies in Bangalore including VXL, Mastek, Software Systems, Microland & Sun Pharmaceuticals (some of whom went public). It saw itself as funding technology ventures and did not focus directly upon commercial objectives. It made 40 investments managed by 7 professionals. Till 1994 the internal rate of return was 28%

TDICI Spillovers played an important role in the formalization of Indian VC industry. K. Nadkarni (former president) established the **Indian Venture Capital Association (IVCA)**, and was the Indian partner for the first US firm to begin operations in India (Draper, in 1994). Another top manager joined ICF Ventures, a fund subscribed to by overseas investors. Also, a number of TDICI alumni became managers of Indian high technology firms.

#### *Policy Evaluation*

The direct impact of First Phase VC policies on growth of VC in India seems to have been relatively weak. It seems that no additional VC fund got established during the later 80s and early nineties. The policy should be considered a VC Background or Pre-Emergence Policy since it did not lead and was not intended to lead to VC emergence (conditions for such emergence were still weak in the late 80s- including the regulatory environment which was still very difficult). In this case the policy should be evaluated in terms of its indirect impact.

The first VC program implemented in India gave proof that a VC could be successful in India-despite all its constraints. It also ‘trained’ a cadre of experienced personnel that would subsequently become active in or move to the private sector. These effects are not trivial and may have contributed to the Second Phase of India's VC industry (1995-99) where a moderate expansion of the VC industry took place.

A second issue is whether there could have been a better design of VC directed policies- given the environment. While the environment was not favorable probably more experimentation and policy learning could have preceded (or could have accompanied) the policy actually implemented. The latter could have addressed the constraints facing private or hybrid public/private VC organizations and could have probably offered a package of incentives and accompanying liberalization adapted to the needs of such a VC segment. This is difficult to ascertain, but it is clear that the policy from the beginning was directed to State owned and State operated financial

institutions-a fact that must have limited its focus. It excluded experimenting with private VC funds either publicly held or Limited Partnerships. Even if this was not feasible in 1988 it still might have been feasible in 1992.

To pursue this further note that -a policy directed to creating favorable conditions for the future emergence of VC *need not be directed only at the VC industry*. For example, the Israeli experience during the two decades prior to 1990 shows the importance of generating R&D & innovation capabilities in the business sector. It also shows how such capabilities might benefit from a 'backbone' R&D grants scheme which is horizontal, neutral and directed to the business firms (rather than to the institutions of the infrastructure). If such a policy would have been implemented in India during the 80s (probably in parallel to the VC-directed policy mentioned above); and if it would have been focused on SMEs (as in Israel and in the US's with the SBIC program)-an emerging demand for Silicon Valley VC services would have been generated. This might have transformed the recorded growth of VC companies and VC capital under management in the 90s into a true 'VC industry Emergence' process. Through virtuous co-evolutionary processes it might also have accelerated the emergence of an R&D and product oriented IT sector.

#### *India's Venture Capital during the Second Period 1995-99*

Indian entrepreneurs became more successful in Silicon Valley during the 90s and this encouraged the notion in the US that India may have a pool of potential entrepreneurs. This factor undoubtedly must have increased the interest of foreign VCs and of NRI in considering VC investments in the country.

#### *Types of Companies and Funds Raised*

The first half of the 90s shows the establishment of the first foreign owned VC company (Draper International) and the first truly private & independent, domestically owned, VC company. A few other VCs of both types were established--especially after 1995/6 e.g. Walden-Nikko India Venture Co. in 1996. Some of these involved financial participation of Non-Resident Indians (NRI). The process was accelerated when the single VC industry regulator (SEBI) announced the first guidelines for registration and investment by VC firms. The largest VC firms in terms of capital were located in Bangalore: TDICI, Draper, Walden-Nikko, JumpStartup and e4e. We also observe the beginning of a co-evolutionary processes with positive feedback: early VCs of the new type influenced the institutional-regulatory

environment and this favored establishment of more private/independent and more foreign VCs.

VC-Pool grow significantly after 1994, increasing from 200M\$ to over 750M\$ during 1998<sup>52</sup>. The most important new source of funds was 'Foreign Institutional Investors' who became the most important source of funds (displacing the traditional source-'All India Financial Institutions') . Very often NRI (non-resident Indians) were important investors.

#### *The Indian Venture Capital Association (IVCA)*

IVCA was established in Bangalore in 1993. According to D & K op cit this represents the beginning of the formalization of VC in India. The prime mover was Nadkarni, its first president. There were (9) members, the majority of which were subsidiaries of Indian Government Agencies or banks and received funds from international development agencies. IVCA did not succeed in addressing the main problem of most of its members-absence of tax pass-through

#### *Policy Evaluation (Second Phase)*

The main policy actions involved regulatory changes, with some advance being made in a number of areas. However, numerous regulations still exist in India which goes against the establishment of a thriving VC industry; and some attempts at reform have led to a new layer of complexity and bureaucratic involvement. There seems to have been no VC-directed *targeted policies* like the Yozma Program implemented in Israel during 1993-7. No incentives seem to have been extended to private, independent VC companies with a clear organizational perspective (e.g. allowing for LP), with a preoccupation with 'critical mass', with entry of 'professionals and experienced' agents into the industry, and with learning. This seems to us to be a failure *by omission of India's ITP in the VC area*<sup>53</sup>.

Having said that it might be that, despite the enormous growth of software in India and other favorable factors, conditions were not yet ripe for such a targeted policy aimed at creating a domestic VC industry. This argument has some force

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52 The figures were taken from D & K 2002 op. cit. They do not reflect a 'strict definition' of VC (see Section 5.1 above); nor do they properly account for the VC activity of foreign VCs.

53 Incentives to VC were undoubtedly created in some cases as a result of liberalization or reductions in taxation, but, again, these were not part and parcel of a VC policy perspective thriving to create a VC industry. In the 90s, such an objective would require providing strong incentives to those involved in appropriate forms of VC organization, in bringing together professionals as a manager/owner VC team; and in assuring the participation of well connected & knowledgeable VC-related individuals or organizations from abroad.

especially given what we now know in retrospective-the small window of opportunity in terms of global world capital markets. However, in our opinion, 1995/6 might still have provided sufficient time for a measure of "true" emergence to take place prior to the full onset of the current world crisis in IT high tech.

### Overall Policy Evaluation

VC policies in the First Phase of the VC industry (1986-95), while having a weak direct impact, contributed to create conditions for VC emergence during the Second Phase (1995-99) or beyond (*an indirect impact*). In retrospect, there seems to have been room for improvement both in their design and in their focus e.g. in the extent of experimentation with different kinds of VC activities and with different kinds of VC organizations. Moreover, the experience of both Israel and the US would indicate the possibility that the background conditions for future VC success in India would have been better served if the promotion of business sector R&D/innovation would have been the strategic priority of policy makers at the time<sup>54</sup>. This of course would have entailed the implementation of other promotion measures beyond those promoting VC.

The sharp increase in VC activities during and after 1994 created new conditions for a policy driven VC-emergence process in India. Globalization of capital markets, the larger number of active NRI, the growing software industry, and regulatory-institutional reform meant that Venture Capital was becoming a Class B Infant Industry (see Section 4 above). Despite the possibility that a self-reinforcing co-evolutionary process could lead to VC emergence even in the absence of Government intervention, Class B VC industries might still require Government support<sup>55</sup>. This view received reinforcement (at least partial reinforcement) on the positive side from the Israeli Experience where targeted VC-directed policies led to VC emergence during 1993-7<sup>56</sup>. By a similar token this view is sustained by what seems to have been absence of '*full VC industry emergence*' in India<sup>57</sup>-a state of affairs which co-existed with absence of a specific or targeted VC-policy after 1995. It could

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54 This point has been raised in Teubal 2002.

55 See Section 4 and A & T 2002c

56 A & T 2002a,b op cit.

57 India's VC industry nowadays still 'remains a small industry precariously dependent upon other institutions, particularly the government and external actors such as international lending agencies, overseas investors, and successful Indian entrepreneurs of Silicon Valley' (D&K op cit). In our opinion, while the VC industry exists there was no process of full VC industry emergence in the sense of the US (late 60s, early 70s) & Israel(1993-7). In such instances the processes were spurred by a cumulative process leading to rapid growth first and to VC maturity shortly shortly after this event.

be that absence of a specific or targeted VC directed policy during the Second Phase was a non-trivial *failure of omission* of Indian ITP.

This does not mean that VC emergence is not possible in the future-on the contrary. A number of favorable conditions exist including some indirect effects of the policies implemented so far which make this a very realistic possibility. This despite the fact that the favorable conditions co-exist with a number of constraints within India (institutional-regulatory, currency convertibility, etc); and the fact that 'full' VC emergence may have to wait for recovery of both world IT product markets and global technology markets. But the Israeli experience and the theoretical perspective associated with Class B infant industries suggests that a sophisticated *targeted VC directed Policy* may be required to overcome (or compensate for) some of the constraints; to assure critical mass; and to enhance the likelihood that a cumulative, learning & positive feedback process will set in.

## CONCLUSIONS

Success in developing a Venture Capital industry may require adopting an evolutionary-systemic perspective not only of the processes involved before and during VC emergence but also of policy-business sector co-evolution.

We suggest that the main obstacles in developing a significant high quality VC industry are system failures (and not market failures). This implies that targeted policies that aim to create a VC industry should take the context in which they operate seriously and carefully define policy objectives. A major aspect is to focus on system measures & on attracting professional venture capitalists which could channel the industry toward investment according to strict VC definitions.

Israel's successful experience took place in the background of a very favorable set of conditions, both internal and external, some of whom continued to be favorable during VC industry emergence up to 'Consolidation' towards the end of the 90s. Because of this it is our view that the Israeli experience and Israeli VC policies are not directly replicable elsewhere. What can be adopted are specific aspects of the policies implemented. Also, some aspects of the Evolutionary/Systemic perspective used to interpret the Israeli experience may be applicable to other countries-both to 'interpret' past attempts at developing VC and as possible guides or suggestions for the future. We illustrate this by undertaking an analysis to the experiences with VC and VC policy of the US and India.

The main themes covered by the paper are three: 1) the nature and impact of Yozma (the Israeli targeted VC program, which led to VC emergence) including the context in which it was implemented; 2) A conceptual framework for analyzing VC policies, one which co-evolved with our study of the Israeli case; and 3) preliminary application of this framework to (re)-analyze the US and Indian cases.

### *Yozma and the context in which it operated*

Very favorable conditions were being created in Israel during the 80s and early 90s. These included: pre-existing R&D/Innovation capabilities & links with US product & capital markets (Israel had a weak IPO market domestically which turned out to its advantage); achievement of macroeconomic stability, and a process of capital market liberalization. Moreover, VC emergence (1993-8) was preceded by a 3-4 year pre-emergence period (1989-92) with significant VC-like and SU activity. During these years important Business & Policy Experiments/Learning took place and there seems to have been a strong 'excess demand' for VC services.

Despite the strength of the VC market (*Class A Industry*), VC Emergence was not market-led but was triggered by a *targeted VC directed policy (Yozma)*. This incentives'

program induced entry of high quality, professional agents and VC management teams domestically; and of significant ‘intelligent’ capital from abroad. This configuration & its projection (additional entry, very successful exits, etc) explain why VC emergence was very fast, why it involved strong VC-SU co-evolution; and why the industry ‘consolidated’ or arrived at maturity after 6-7 years.

Yozma was critical due to two sets of factors: *first*, as a means to overcome ‘coordination & other failures’ to achieve critical mass; collective learning; cluster effects and economies of scale; *second*, a mechanism to deal with specific VC industry characteristics & constraints flowing from the Globalization process of the 90s. More specifically, ‘intelligent’ and networked capital will flow to VCs operating in areas with strong high tech ‘potential’ & showing outstanding returns in a short period of time. Moreover when such reputation effect engulfs several VC companies simultaneously it coalesces into a ‘VC industry & high tech’ reputation for the country.

The objective was to create an efficient VC *industry* which drew high quality professionals into specialized organizations (not simply to attract Venture Capital). Issues of taxation were sorted out in the early 90s; & a critical choice of supporting the Limited Partnership form of organization was made. Moreover, the strong emphasis on incentives to the upside was very important for attracting ‘professional teams’ to the emerging VC funds and VC companies.

The final design underscores the singular *policy process* underlying the program. First, policy makers identified a missing component of the high tech cluster--Venture Capital. This was *de facto* characterized as a *System Failure*. As a result of this and of strong interaction with the business sector during pre-emergence- Yozma’s design made *explicit* a large number of parameters which seem to have been left implicit in the VC policies of other countries.

Yozma was implemented at the right time, the outcome of an evolutionary process and luck. We would emphasize two aspects: *First*- the overlapping of critical mass & collective learning on the one hand with the expanding global technology product & capital markets on the other; *second*- implementation only after ‘Class A Industry’ conditions were generated (e.g. after suitable experimentation & learning; after appearance of an excess demand for VC services, etc)

#### *Conceptual Framework for Evaluating Country VC Policies*

The framework resulted from adopting a Systems/Evolutionary perspective to the evaluation of Venture Capital. The main components are

a) A definition of VC Emergence and determining whether or not this process took place in the countries analyzed;

- b) The Context under which VC policies operated: in particular whether a coherent set of favorable Background Conditions, Events & Processes existed or took place;
- c) Pre-emergence period: identifying VC or VC-related activity, SU activity prior to VC emergence; & business experiments and policy learning prior to emergence;
- d) Impact of *VC policies*: there are two sorts of impacts i) improvement of Background Conditions; & ii) contributing to or triggering VC Emergence. VC policies which have not led to VC emergence need not always be considered a 'failure' if their contribution to Background Conditions was significant.
- e) *Evaluation of the 'relevant' Portfolio of Policies*: whether the sets of policies implemented during the 'background', pre-emergence & early-emergence periods -was adequate. For this purpose we need an accepted classification of VC-related policies which distinguishes between incentives programs versus institutional changes; general policies versus *VC-directed* or *VC-targeted* policies; different types of incentives & different types of institutional changes, etc;
- f) *Policy-Business sector Co-Evolution*: whether or not a virtuous process leading to VC-directed policies took place. While this may be difficult to ascertain, aspiring to achieve this objective will enhance our capacity to identify policy implications (e.g. for other countries) from successful cases of implementation of VC-policies;
- g) *Infant Industry perspective*: Determine whether, at the time of implementation of VC-directed policies, the VC activity at the time was Class A or Class B. If Class A--targeted VC policies might be adequate to generate a fast process of VC emergence; if Class B-- the promotion of VC should be implemented by Phases. A first phase should focus on generating favorable background conditions including experiments, policy learning etc; while a second phase might focus on more specific or targeted VC policies.

The above framework evolved from our analysis of the Israeli case. Preliminary results from applying it to the US suggests that VC emergence in the US (late 60s early 70s) was a *market led process*; it was not triggered by a VC-directed or targeted program of incentives such as that which led to VC emergence in Israel 25 years later. However VC-directed & VC- related policies of the Federal Government, particularly the support of SBIC during the sixties/seventies, were *critical* since, through experience and learning, they helped generate adequate background conditions which both defined the VC concept and led to VC emergence. In India early VC-directed policy initiatives in the late 80s-early 90s seem to have

contributed—together with other endogenous & exogenous factors- to the creation of background conditions for VC emergence during the second half of the 90s. The fact that this did not seem to have taken place attests, in our opinion, both to the narrow window of opportunity of the late 90s and to a possible *policy omission* or lost opportunity. While a targeted VC –directed program was not implemented then, the very good prospects for Indian IT high tech once the world crisis is over suggests that such a program could be a central axis of ITP in the future.

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