# Venture Capital Investments*⁾:
# a regional perspective in Israel

*⁾Venture capital funds, angels, strategic investors and others

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- **Objective**: identify the patterns of spatial distribution of Venture Capital investments
- **A basic assumption**: venture capital investors actually play two roles
  - provision of capital
  - involvement in entrepreneurship and management
- **Hypothesis**: the regional distribution of venture capital investments is even more centralized than that of high-tech activities

# General background

- Knowledge base economic activities tend to concentrate (Capello,2002 for Milan; Cooke & Schwartz, 2003 for EU and Israel; Bar-El &. Parr, 2003; Felsenstein & Ergas, 2002; Frenkel & Shefer, 2001; Frenkel, A., 2001 for Israel)

- And even more, the business services and high tech activities

- Main factors for concentration: spillovers, relational capital, tacit knowledge, process of knowledge acquisition, innovation networks.

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**Spillover** (Quah, 2002), (Baranes & Tropeano, 2003), (Wallsten, 2001).

**Relational Capital** (Capello & Faggian, 2005)

**Tacit knowledge** (Howells, 2002, Maskell & Malmberg, 1999)

**Process of knowledge acquisition**(Zellner and Fornahl, 2002), (Rosenkopf, 2003; Almeda et al, 2003).

**Innovation networks** (Sternberg, 1999, Collinson & Gregson, 2003), (Havnes & Senneseth, 2001).

# Venture capital investors

They also supply entrepreneurship and management.

- identify firms with growth potential
- accessibility to resources (Gompers & Lerner, 1999, 2001, 2005; Sapienza, 1992; Elango et al., 1995; Sapienza et al., 1995; Jain, 1999; Van Osnabrugge & Robinson, 2000; Brierly 2001; Allen, 2002; Brancomb & Auerswald, 2001; Lindstrom & Olofsson, 2001; Helman & Puri, 2002a, b; Wang et al. 2002; Allen, 2003).
- own resources and networks

- Consequently: return to entrepreneurship, in addition to the return to capital.

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# The location of venture capital investments

- **Capital** is highly mobile
- **Entrepreneurship and management** - much lower mobility

# The entrepreneurship location-

- frequent contacts
- tacit nature ("tacit information brokers")
- regional networks
- Proximity is important

# Main factors in the location of venture capital investments

- Distance to the venture capitalist location (Auerswald & Branscomb, 2003, Gompers & Lerner, 1999).

- Agglomeration of Start-Ups firms

- Agglomeration of venture capital investors

- Existence of a focal growth place

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# Hypotheses

The regional distribution of venture capital investments is even more centralized than that of high-tech activities:

1. higher concentration level than the high-tech activity.

2. focal points at close vicinity

3. higher amount of investment

# Database

- Population: 1995-2004, new small firms
- Variables:
  - Characteristics of investment
  - Characteristics of firm
  - Characteristics of investors
  - Global employment data
- Sources: IVC information base and CBS.

# Basic data

- 2,557 investment cases, in 1,300 firms.

- 6.3 billion US$.

- 27 employees per firm

- 2.45 million US$: Average investment sum (4.7 per firm, 0.25 per employee)

- 6 districts
  - 4 districts that are considered as "centers"
  - 2 districts that are considered as "periphery

- 15 sub-districts (8 -centers, 7- periphery)

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# Methodology for the testing of hypotheses 1 and 2

- Comparison of regional distribution of employment in high-tech sectors (EHT) with that of employment in all sectors (ET), and then the distribution of venture capital investments (VCI) with the frequency of employment in high-tech (EHT).

- location quotients of high-tech: $LQ(EHT)i = \%EHTi/\%ETi$.

- location quotient of venture capital in relation to high-tech activity: $LQ(VCI)i = \%VCIi/\%EHTi$

# Main results for hypothesis 1

- heavy concentration of high-tech employment , low levels in the Northern and Southern peripheries.

- the distribution of venture capital is even more concentrated than that of high-tech activity

- highest location quotient in the Center district, which has also the highest concentration of high-tech employment: the regional distribution of venture capital emphasizes even more the gaps in the distribution of high-tech activities.

# Distributions and location quotients of high-tech employment and of venture capital investments by districts, % and ratios

| | % VCI | % ET | % EHT | LQ(EHT)= %EHT/%ET | LQ(VCI)= %VCI/%EHT |
|---|---|---|---|---|---|
| Jerusalem | 8 | 11 | 7 | 0.6 | 1.1 |
| Northern | 9 | 13 | 10 | 0.8 | 0.9 |
| Haifa | 7 | 14 | 11 | 0.8 | 0.7 |
| Central | 40 | 22 | 33 | 1.5 | 1.2 |
| Tel Aviv | 33 | 28 | 30 | 1.1 | 1.1 |
| Southern | 2 | 12 | 9 | 0.8 | 0.2 |
| Total | 100 | 100 | 100 | 1.0 | 1.0 |

# A support for the focal places (hypothesis 2)

- Highest relative attraction of venture capital to urban centers in the proximity of Tel-Aviv,

- Moderately high attraction of venture capital to the main urban center of Tel-Aviv, but not necessarily to all main centers

- Venture capital investments refrain from peripheral regions, but not necessarily from all of them

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# Id. by sub-districts

| | % VCI | % ET | % EHT | LQ(EHT)= %EHT/%ET | LQ(VCI)= %VCI/%EHT |
|---|---|---|---|---|---|
| Jerusalem | 8 | 11 | 7 | 0.7 | (1.1) |
| Zefat,Kinn,Golan | **0** | **4** | **1** | **0.4** | **0.0** |
| Yizre'el | **8** | **5** | **4** | **0.9** | (**1.8**) |
| Akko | **1** | **5** | **4** | **0.8** | **0.4** |
| Haifa | 4 | 10 | 10 | 1.0 | 0.4 |
| Hadera | 3 | 3 | 1 | 0.2 | (4.0) |
| Sharon | 7 | 4 | 2 | 0.5 | (3.0) |
| Petach-Tiqva | **23** | **8** | **14** | (**1.8**) | (**1.6**) |
| Ramla | 3 | 4 | 9 | (2.2) | 0.4 |
| Rehovot | 7 | 6 | 7 | (1.2) | 0.9 |
| Tel-Aviv | 33 | 28 | 30 | (1.1) | (1.1) |
| Ashkelon | **1** | **5** | **4** | **0.7** | **0.2** |
| Beer-Sheva | **1** | **7** | **6** | **0.8** | **0.2** |
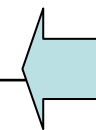
# Some reflections about the focal concentration of VCI

- partly explained by distance from the main center and probably by a tendency to invest in specific types of high tech.

- A location coefficient is calculated for the relationship between the distribution of VCI and of employment, and is defined for example for the distribution of EHT as:

$$LC_{VCI-EHT} = \frac{\sum_{i=1}^{13} |\%VCI_i - \%EHT_i|}{2}$$

| Location coefficient of the distribution of VCI between sub-districts in relation to the distribution of employment in: | |
|---|---|
| Total employment: | 0.27 |
| HT | 0.23 |
| HT in manufacturing | 0.36 |
| HT in services | 0.21 |
| Knowledge economy | 0.25 |
| Knowledge private eco. | 0.23 |

LC for HT in services is the lowest: special attraction of VCI to this type of activity.

This may explain the low level of VCI in the periphery, where a relatively high proportion of HT is in manufacturing.

# Main result for hypothesis 3:
The higher attractiveness for investments in focal centers leads to higher sums of investment per case and per firm.

| | Mean (millions US$) | S.D. |
|---|---|---|
| Jerusalem | **2.06** | 2.46 |
| Northern | **2.34** | 2.74 |
| Haifa | **2.07** | 2.63 |
| Central | **2.72** | 2.64 |
| Tel Aviv | **2.48** | 2.62 |
| Southern | **1.89** | 2.26 |
| **Total** | **2.46** | 2.63 |

Average investment amount (per case of investment), by districts (million US$)

Higher average investments in districts with higher attraction for venture capital.

Analysis of variance: significant differences at $p < 0.01$

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# Id. for sub-districts

| | Mean | S.D. |
|---|---|---|
| Jerusalem | 2.06 | 2.46 |
| Zefat+Golan | 0.17 | 0.31 |
| Yizre'el | **2.68** | 2.87 |
| Akko | 1.72 | 2.28 |
| Haifa | 1.75 | 2.48 |
| Hadera | **2.70** | 2.78 |
| Sharon | **2.68** | 2.56 |
| Petach Tiqva | **2.84** | 2.66 |
| Ramla | **3.24** | 3.21 |
| Rehovot | **2.22** | 2.36 |
| Tel Aviv | **2.48** | 2.62 |
| Ashkelon | **1.83** | 2.26 |
| Beer-Sheva | **1.93** | 2.29 |

Significant differences between sub-districts:

Highest levels of average amount of investments in districts with highest venture capital intensity.

Smallest levels of investments in the periphery.

# Similar picture with average investment per firm

| | Mean | S.D. |
|---|---|---|
| Jerusalem | 3.84 | 8.10 |
| Northern | 4.54 | 12.10 |
| Haifa | 3.67 | 7.39 |
| Central | 5.79 | 9.76 |
| Tel Aviv | 4.54 | 9.99 |
| Southern | 3.03 | 6.99 |
| Total | 4.75 | 9.75 |

| | Mean | S.D. |
|---|---|---|
| Jerusalem | 3.84 | 5.21 |
| Zefat+Golan | 0.17 | 0.31 |
| Yizre'el | 5.77 | 6.68 |
| Akko | 3.03 | 3.83 |
| Haifa | 2.87 | 4.82 |
| Hadera | 5.98 | 6.73 |
| Sharon | 5.24 | 6.90 |
| Petach Tiqva | 6.23 | 6.14 |
| Ramla | 7.74 | 8.79 |
| Rehovot | 4.54 | 5.34 |
| Tel Aviv | 4.54 | 5.53 |
| Ashkelon | 2.93 | 4.19 |
| Beer-Sheva | 3.12 | 4.80 |

Bigger gaps as compared with average amount of investment, indicating more cases of investment per firm in the venture capital intensive locations.

# Conclusion

- Venture capital investments are highly concentrated
- the factor of entrepreneurship and management leads to concentration
- The main factor: the existence of a focal location of high-tech, in the close vicinity to major urban centers

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# Policy implication

- The periphery lacks the attractiveness for the input of the entrepreneurship and management components
- Consequently, the free market may lead to a widening of the gap between the center and the periphery.
- The existence of externalities justifies the involvement of public policy:
  - joint programs with venture capital investors
  - with a focus on specific concentrated locations in the periphery, that have a potential of growth, such as:
  - regional venture capital fund,
  - technological incubators
  transportation networks.