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# Vagabond shoes longing to stray: Why foreign firms list in the United States <sup>☆</sup>

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## Abstract

How do firms that go public decide whether to list on a major stock exchange or locally? Using a unique data set on Israeli IPOs in the US and Tel Aviv, we show that companies that list in the US are young and overwhelmingly high-tech oriented. We argue that high-quality innovative firms are willing to incur additional costs associated with listing in the US in order to reveal their value and distinguish themselves from firms that issue stock back home. Costs of listing in the US include first day underpricing and relinquishing corporate control. © 2001 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

When firms decide to go public, what determines their choice of location? In an environment of international capital mobility, why would a firm choose to

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issue its equity on a major stock exchange rather than on a local market? In this paper we find that listing on a major exchange involves additional costs, but provides a credible signal of firm value, suggesting that listing in the US would be worthwhile for high-quality firms. This proposition is supported by evidence from a unique sample of Israeli IPOs in Tel Aviv and in the US.

A large body of the finance literature focuses on the question of why firms choose to become publicly traded and raise funds on a stock exchange rather than remain private and rely on internal funds or bank loans (see Pagano et al., 1998). In addition, there is a relatively large literature dealing with multiple stock listings, i.e. firms that list on their home market *and* abroad (see Pagano et al., 1999). Nevertheless, little attention has been paid to the choice of *where* to issue equity in a setup where companies completely by-pass their home market and list exclusively in a foreign country. The reason is probably that the phenomenon of foreign (other than Canadian) firms listing their shares only in the US but not at home (i.e. not as a multiple listing) is relatively new.<sup>1</sup>

This paper attempts to fill this niche and shed light on the decision of foreign firms to list their shares *exclusively* in the US, using data on Israeli IPOs in the 1990. Israeli IPOs provide an exceptional opportunity to investigate this issue: Since 1991, so many Israeli companies have issued equity in the US that by 1995 the number of NASDAQ-listed Israeli firms nearly equaled the number of all other foreign firms combined (excluding Canadian companies). 1995 and 1996 witnessed another 25 IPOs of Israeli industrial and software firms, so that Israel is still by far the largest “exporter” of IPO firms to NASDAQ.<sup>2</sup> During the same time period, more than a 160 Israeli manufacturing and software corporations issued stock through initial public offerings on the Tel-Aviv Stock Exchange (TASE), raising the number of listed companies in these industries from about 100 to over 250. Our data set, consisting of detailed information on more than 200 Israeli firms that went public *either* in New York (New York Stock Exchange and NASDAQ) or in Tel Aviv from 1990 to 1996, is ideal for an empirical investigation of listing choice.

The literature on multiple listing suggests a number of factors that may influence a firm’s decision to list its equity abroad. Some studies emphasize the degree of integration between the home and foreign capital markets, a consideration that seems less relevant when firms list *exclusively* in one market.<sup>3</sup> Other explanations proposed by Pagano et al. (1999) are that foreign listing

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<sup>1</sup> Foreign issues of bonds, which are not addressed here, are more common. Also note that very few US firms list exclusively abroad.

<sup>2</sup> See “The NASDAQ Stock Market 1996 Fact Book”. 15 additional IPOs took place in 1997.

<sup>3</sup> For example, Alexander et al. (1987) argue that a firm can reduce its cost of capital by listing its shares both abroad and locally if foreign and domestic capital markets are not fully integrated. This hypothesis is tested in a number of empirical studies (e.g., Howe and Madura, 1990; Ko et al., 1997). See also a Howe and Kelm (1987) and a survey by Karolyi (1998).

may reduce barriers to foreign investors or improve the firm's reputation in product markets. Cheung and Lee (1995) and Fuerst (1998) argue that if stock markets differ in regulations and disclosure requirements, listing in the market with the more rigorous rules might serve as a signal of firm quality. This listing choice may serve as a means to credibly convey information to investors about the firm's future prospects. These studies imply that the value of the signal to a high-quality firm might be sufficiently high to offset the costs resulting from its disclosure of important private information, which might benefit its rivals. A separating equilibrium may therefore exist in which high-quality firms issue shares in the market with more stringent disclosure requirements, while lower quality firms choose less demanding locations. We are not aware, however, of any empirical studies exploring these issues.

In this paper we too argue that "signaling" plays an important role in attracting foreign firms to US equity markets, although differences in disclosure rules may not provide a full explanation for the phenomenon of listing exclusively in the US instead of on their home markets. In fact, in the case of Israeli firms, formal listing requirements in Tel-Aviv are not less stringent than in the US. Indeed, all firms that listed in Israel satisfied the NASDAQ pre-issue listing requirements, while a handful of firms that listed in the US did not satisfy some of the criteria for listing in Tel Aviv. In any case, many of the listing requirements both in Tel Aviv and on NASDAQ are endogenous in that they refer to post-issue firm characteristics such as capitalization. It is therefore possible to plan the IPO so as to meet either exchange's requirements. Moreover, underwriting and administrative costs in the US and in Israel are also quite similar (Gross, 1996). Instead, we argue that listing in the US is costly for other reasons.

One cost associated with a US IPO is the well-documented phenomenon of first day *underpricing*. In contrast to Israeli IPOs which on average are not underpriced, investors who purchased shares of Israeli firms that issued stock in the US realized first day average returns of 20%. Indeed, share prices decreased on the first day of trading in only four issues. Another cost is the percent of equity offered: An IPO in the US leads to a more disperse ownership structure, and often requires original firm owners to relinquish part of their control. By contrast, post-IPO ownership in Tel Aviv is extremely concentrated. Finally, shareholders of Israeli firms that do not list in Israel may have to forgo part of the available exemptions from capital gains tax, so that in this respect listing exclusively in the US is also costly.<sup>4</sup>

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<sup>4</sup> In general, capital gains originating in listed Israeli companies are exempt from taxes for individual shareholders. However, not all NASDAQ-listed Israeli firms qualify for this exemption as they often list through offshore subsidiaries. In addition, there are possibilities for certain tax deferrals on unrealized pre-IPO gains that shareholders of IPO companies enjoy as long as the firm is listed in Tel Aviv. Finally, listing in the US may complicate the legal procedure of distributing options to employees.

We argue that an important benefit provided by a US IPO is that it serves as a means to convey a relatively accurate signal of firm value to customers and potential investors. In order to serve as a signal, listing in the US must reveal the “true type” of listed companies in a way that the Tel Aviv market cannot. For example, Allen (1993) and Allen and Gale (1999) argue that one advantage of US equity markets over bank-based financial systems is in their ability to evaluate future growth and revenue prospects of innovative firms. If so, a US IPO will be less costly for promising innovative firms that may find it difficult to raise funds in Israel’s bank-dominated financial system. Benefits from listing in the US are therefore likely to be related to the trade-off between raising capital in a large stock market, and raising capital within a bank-based financial system. Although we focus on firms that issue equity either in Tel Aviv or in the US, it is important to note that the Israeli financial system is dominated by a small number of large universal banks. Banks are heavily involved in the stock market both as underwriters and as managers of mutual and provident funds that purchase a significant part of the IPO shares. It is therefore possible to interpret the decision of Israeli technology intensive companies to list in New York, as indirect evidence that a stock market-based financial system is more suitable than a bank-based system for funding innovative firms.

Another part of the “revelation of quality” associated with a US IPO could be related to the role of Wall Street firms that underwrite the IPO, thereby providing a “stamp of approval”. Oppenheimer or Lehman Brothers took part in about 40% of Israeli IPOs in the US, whereas the vast majority of underwriters in the local IPO market are affiliated with domestic banks. The idea that well-known US underwriters are important for the certification of firm quality is in line with Michaely and Shaw (1994) and Carter et al. (1998) who show that IPOs issued by reputable underwriters perform better than average.

In line with these predictions, we note that Israeli firms that listed in the US (“US issuers”) in the 1990s are all (with two exceptions) in the electronics and computer software industries. They are young, with low current profits, and extremely R&D intensive, employing relatively large numbers of highly educated people in research and development, and devoting much of the offering proceeds to R&D (and marketing). As for the quality of US issuers, we provide evidence that Israeli firms choosing to list in the US tend to perform better than local IPOs, both in terms of post-IPO revenue growth rates and in terms of post-IPO stock returns. The returns on US issues exceed the returns on TASE IPOs during our entire period of observation (three years) by a very wide margin. It is therefore hard to argue that the difference in returns is entirely due to lower market risk in Tel Aviv, especially given that the fraction of firms with negative returns is much smaller among US issuers. It is also unlikely that the difference is solely due to the “bullish” US stock markets for two reasons. First, the Tel Aviv stock market index rose considerably during the first part of our period of observation (much more so than the US market, see Blass, 1998).

Second, if firms could increase their stock prices by simply listing in the US, why would not all firms do so? Instead, we conclude that US equity markets are able to identify firms whose future performance will (on average) be superior. As mentioned above, we also find that, in comparison to firms that go public in Tel Aviv, US issuers sell a larger fraction of their equity at the IPO. This feature is consistent with the view that in order to use the market opinion to evaluate their prospects, firms have to sell a high fraction of their shares (e.g., Maug, 1997).<sup>5</sup>

The rest of the paper is organized as follows. Section 2 describes the database. Section 3 presents an empirical analysis of factors that affect the choice of where to issue stock. In Section 4 we discuss differences in post-issue performance of US and local IPOs. Section 5 concludes the paper.

## 2. Israeli IPOs: The data

The data are collected from three sources. First, we obtain the prospectuses of IPO firms submitted to the Securities Authority in Israel and the SEC in the US which provide information about lines of business, future prospects, business risks, ownership structure and intended use of IPO proceeds. For each firm we document the date of issue, year of incorporation, IPO proceeds and their designated use, distribution of employees by occupation and role, ownership structure, and sales by country and geographical region.

Our second source of data contains financial statements obtained mostly from a *Compustat*-type database (“*Dukas*”) compiled by the TASE from annual reports. For most of the firms traded in the US for whom data are not provided in *Dukas*, we extract information from the prospectuses and from annual reports.

Our third source consists of stock returns data. The TASE provides the relevant data for local firms, while figures for Israeli firms traded on the NASDAQ and on the New York Stock Exchange are taken from the *Bloomberg* system.

## 3. Pre-IPO differences between Tel Aviv IPOs and Israel IPOs in the US

The sample is described in Table 1. Two hundred and nineteen Israeli industrial and software firms (half in software or electronics) went public from 1990 to 1996, raising \$1.8 billion dollars. About one fourth, or 56 firms, all but

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<sup>5</sup> It is interesting to note that whereas Maug’s model predicts dispersion of ownership for innovative firms of unknown quality, the earlier study of Leland and Pyle (1977) suggests that original owners should retain a large fraction of the equity to signal their “faith” in the company.

Table 1  
Israeli industrial and software IPOs, 1990–1996

	No. IPOs	In Israel	In the US
<i>By year</i>			
1990	3	3	0
1991	12	9	3
1992	54	45	9
1993	80	70	10
1994	35	26	9
1995	17	9	8
1996	18	1	17
<i>By industry</i>			
Software	46	18	28
Electronics	64	38	26
Other	109	107	2
Total	219	163	56

two in software and electronics, issued stock in New York (three on the New York Stock Exchange and the rest on NASDAQ), accounting for more than half of the total amount raised. Two-thirds of the local issues went public in just two out of the six years, 1992 and 1993. By contrast, the distribution of new issues in the US was more evenly distributed between 1992 and 1995, increasing in 1996. We have data on every one of these issues, so that our sample includes the entire population of Israeli manufacturing and software IPOs in the 1990–1996 period.

Table 2 presents descriptive statistics for firms listing in the US and locally. The differences between the two sub-samples are striking:

*R&D intensity is very high among US issuers.* Nearly half of the employees in those firms are involved in R&D, a figure which is 16 times larger than the median for local issuers, and twice as high as the median for local issuers in electronics and software. A similar picture emerges when R&D intensity is measured by the designated use of IPO proceeds. US issuers designate, on average, about 16% of the proceeds to R&D, while the corresponding figure for local issuers is just 1% (3% for local issuers in electronics and software).

*US issuers are younger than the overall sample of local issuers,* and are also younger than local issuers in the electronics and software industries (although the difference is smaller). The average age of Israeli firms that issue stock in the US is similar to that reported by Megginson and Weiss (1991) for a sample of venture capital-backed American IPOs in the 1980s. The fact that these firms are both innovative and young may also explain the large fraction of the IPO proceeds they designate for marketing their products.

*US issuers raise considerably more funds through their IPOs.* On average, Israeli IPOs in the US raise over \$18 million in their IPO, a figure that is lower

Table 2  
 Israeli IPOs – sample statistics (means, except where otherwise noted)

	Tel Aviv IPOs <i>N</i> = 163	Tel Aviv IPOs in electronics and software <i>N</i> = 56	US IPOs <i>N</i> = 56
Pre-IPO total assets (million \$)			
Mean	14.3	6.3	24.1*
Median	6.2	3.7	5.9
Number of employees (median)	93	69	83.5
Size of the IPO (million \$) <sup>a</sup>			
Mean	4.7	3.7	18.2*
Median	3.2	2.7	15.9
Percent employees in R&D			
Mean	12%	30%	47%*
Median	3%	24%	48%
Percent of proceeds designated for R&D	1%	3%	16%*
Percent of proceeds designated for marketing	1%	1%	16%*
Age (yr)	21	16	9*
Pre-IPO ownership concentration (Herfindahl–Hirschman index)	7876	7892	5560*
Pre-IPO share of foreign ownership	5%	3%	17%*
Percent of equity offered at the IPO	21.4%	21.6%	26.3%*
Post-IPO ownership concentration (Herfindahl–Hirschman index)	4905	4953	2893*
Pre-IPO operating profits/sales <sup>b</sup>	16.7%	18%	10%*
Revenue growth in the year prior to the IPO	17%	23%	37%*
Exports as a percentage of revenue			
Mean	24%	27%	78%*
Median	2%	2%	93%

\* Statistically significant (at the 5% level) difference in means between the sub-sample of US issuers and the sub-samples of local issuers and local issuers in electronics and software.

<sup>a</sup> Excluding proceeds generated by sales of shares by original owners.

<sup>b</sup> Excluding eight firms that issued in the US and had profit rates below –100%.

than the NASDAQ average, but far bigger than the \$5 million raised (on average) in local issues. <sup>6</sup> This difference in IPO size far exceeds the statistically insignificant differences in median firm size between the two groups of firms (measured by pre-IPO assets or the number of employees). Instead, the discrepancy exists because US issuers offer a larger proportion of their stock when they go public, and as a result their post-IPO ownership is relatively disperse. Because the ownership of US issuers is more disperse even prior to the IPO, listing in the US often leads to loss of control by original shareholders. <sup>7</sup> While

<sup>6</sup> The figures refer to new capital raised by the company at the IPO, and exclude proceeds generated by sales of shares by original owners.

<sup>7</sup> Note also that even prior to the IPO, foreign shareholders hold more equity in firms that list in the US.

this may be necessary in order to enable the market to evaluate the firm, for the firm's original owners, relinquishing control can be viewed as a cost associated with an IPO in the US.<sup>8</sup> In comparison, in local IPOs only about 20% of the equity is offered at the IPO, and little more in subsequent seasoned offerings, so that ownership remains extremely concentrated (Blass et al., 1998a,b).

*Pre-IPO profitability and revenue growth rates.* Prior to going public, US issuers exhibit lower profit margins than the local issuers, but are nonetheless characterized by higher growth rates.

Our findings that US issuers are young, high-tech and high growth companies that offer a large fraction of equity are consistent with the view that the US IPO is a costly signal of quality for “promising” firms. It is also consistent with the view that large (US style) stock markets are more suitable than banks for the task of evaluating such innovative firms (e.g., Allen, 1993).

*The ratio of exports to sales* among US issuers is, on average, more than three times larger than for local issuers. The differences in medians are even bigger. Indeed, many of the local issuers do not export at all, while this is rarely the case for US issuers. This is in line with another benefit of listing in the US: Firms gain value when listing their equity in a capital market where their customers in North America, Europe, and East Asia can easily monitor them.<sup>9</sup>

Table 3 (panel 1) presents Probit regressions of the choice of issue location for the entire sample and for firms in high-tech industries. Because listing requirements in Israel and the US are similar so that virtually every firm could have issued either in Tel Aviv or in the US, the coefficients reflect the effect of firm characteristics on the decision to issue in the US. The dependent variable, PLACE, is a dummy variable which takes the value one if the firm issues in the US and zero otherwise. To avoid simultaneity problems due to the possibility that the size and location of the IPO may be jointly determined, we instrument (panel 3) for the (log) of the IPO size by using pre-IPO firm size and growth rates. The estimation procedure is therefore two-staged, where IPO size is estimated in the first stage and its fitted value is then used in second-stage Probit regression. In addition, the percent of equity offered and the choice of IPO location are likely to be jointly determined as well. Although in Table 3 we use post-issue ownership concentration as a

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<sup>8</sup> From 1992 to 1997 20 of the US issuers in our sample raised on average an additional \$40 million in seasoned offerings, further diluting the owners' control.

<sup>9</sup> Saudagaran (1988), Mittoo (1992) and Pagano et al. (1999) similarly report that access to foreign customers is an important consideration for firms that *cross-list* their equity on foreign exchanges. Note, however, that the US accounts for about half of the exports of US issuers in our sample. Moreover, a survey conducted by Idit Yotav of the Bank of Israel in 1998 suggests that for these firms the percent of sales in the US does not increase in the years following the IPO. It would therefore be incorrect to conclude that firms issue equity in the US because this is the *only* market for their products.

Table 3  
 Probit regression results<sup>a</sup>

Dependent variable	Full sample			Electronics & software firms only		
	PLACE (1)	PLACE (2)	LN proceeds (3)	PLACE (4)	PLACE (5)	LN proceeds (6)
<i>C</i>	-28.7 (-3.6)	-27.6 (-3.5)	5.3 (14.0)	-12.6 (-3.2)	-36.6 (-2.7)	5.2 (9.3)
Percent of employees in R&D	3.9 (3.1)	3.9 (3.1)		2.3 (2.3)	-0.6 (-0.4)	
Percent of proceeds designated for R&D	4.5 (2.1)	4.8 (2.1)			8.5 (2.1)	
Percent of proceeds designated for marketing	10.3 (3.5)	9.8 (3.3)			13.1 (2.6)	
Age	-0.08 (-2.5)	-0.08 (-2.3)		-0.03 (-1.2)	-0.12 (-2.1)	
Share of foreign ownership	-0.03 (-2.1)	-0.03 (-2.1)		-0.02 (-2.1)	-0.03 (-1.6)	
Post-IPO ownership concentration (Herfindahl–Hirschman index)	-0.0007 (-3.2)	-0.0007 (-3.2)		-0.0005 (-3.6)		
Pre-IPO operating profit/sales	-1.9 (-2.1)	-1.8 (-2.0)		-1.8 (-2.4)	-3.3 (-2.6)	
Export as a percent of revenue	2.7 (3.3)	2.8 (3.3)		2.6 (3.9)	5.8 (2.9)	
Instrument for LN (proceeds), using regression (3) or (6)	3.3 (3.5)	3.2 (3.4)		1.5 (3.2)	4.1 (2.7)	
Dummy for IPO in 1990–93 (“Hot Market” Issues)		-0.4 (-0.78)			-3.0 (-2.2)	
Ln (total assets)			0.35 (8.2)			0.4 (6.0)
Pre-IPO annual revenue growth rate			0.79 (5.1)			0.7 (3.5)
Log likelihood	-19.6	-19.3		-26.78	-14.3	
<i>R</i> <sup>2</sup>			0.29			0.32
Sample	219	219	219	110	110	110

<sup>a</sup> PLACE equals one for US IPOs, and zero otherwise. *t*-statistics in parentheses.

regressor, we examine an alternative specification where pre-IPO ownership concentration and ownership concentration squared are used as instruments for post-issue ownership structure. This specification does not change any of the results, and is not presented.

Our impressions from Table 2 remain unchanged: US issuers spend more resources on R&D (and marketing), and tend to be younger and (prior to going public) less profitable (in terms of accounting profitability). US issuers are more diffusely owned after going public (as measured by their ownership concentration). Finally, US issuers are significantly more export-oriented.

These results are robust and hold in a variety of specifications. A dummy variable for IPOs of the “hot local market” period of the early 1990s does not substantially affect the results (panel 2).

Because US issuers (with two exceptions) are either electronics or software companies, we repeat the analysis using only TASE and US issues in those industries (Table 3, panels 4 and 5, instrument in panel 6). The results remain mostly unchanged. Even within the population of these two high-tech industries, the more R&D and export-oriented firms tend to issue in the US, rather than on the TASE. Again, younger, less profitable firms opt for the US, where they offer a larger proportion of their equity. Both Probit procedures predict very well the issue location of virtually all the firms in the sample, and furthermore, the findings in Table 3 appear to be robust in a variety of specifications.<sup>10</sup>

#### 4. Post-IPO performance

In the previous section, we compared pre-IPO attributes of US and local issuers. This section deals with post-issue differences in performance. We briefly discuss post-issue revenue growth rates and then proceed to examine first day and long-run stock returns for US and TASE IPOs. First day returns are an indication of underpricing. If US issues are underpriced (e.g., Ritter, 1991)<sup>11</sup> while TASE issues are not, then there is an additional cost of issuing in the US. A US IPO may therefore signal firm quality to investors and customers simply because only “good” firms would be willing to sell their shares at a discount in order to reveal their ability to succeed in a large and developed capital market.<sup>12</sup> We then turn to long-term returns as a measure of quality, indicating whether firms that produce high returns over time tend to issue in the US or

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<sup>10</sup> The results remain virtually unchanged when six US issuers for whom it is not clear whether they could have met the value-added requirement for listing on the TASE are excluded from the regressions. The results are also unchanged when we exclude the eight least profitable firms that issued in the US and had pre-IPO loss rates that exceeded 100%, although the level of significance of pre-IPO profitability is lower in this specification. These experiments are not presented. Note also that because of multi-collinearity problems within the sub-sample of high-tech companies, we exclude some right-hand side variables from some of the regressions. This does not affect our conclusions, and the results do not qualitatively change when other variables are excluded instead.

<sup>11</sup> There is evidence for IPO underpricing in other countries as well: see, for example Jenkinson (1990) for Japan and the UK, Kunz and Aggarwal (1994) for Switzerland, and Biais (1996) for France.

<sup>12</sup> One example of this line of argument is Welch (1989) who argues that underpricing may serve as a signal for high quality firms that are “rewarded” in subsequent offerings. The fact that by 1997, 20 US issuers raised additional capital in seasoned offerings is consistent with this argument. Stoughton et al. (1997) also argue that only high-quality firms will agree to sell their shares at a discount, but they suggest that the purpose is to attain certification of product quality.

locally. For both local and US IPOs we calculate post-issue (excess) stock returns for a period of three years after the IPO.

Among local issuers there are firms that issued straight equity (nearly 80% of the sample), as well as firms that marketed their securities as “bundles” of stock and warrants at the IPO. Since the components of the bundles are arbitrarily priced (warrants are often arbitrarily priced as zero), we calculate the total return on the first day of trading as equal to the return on the bundle, and from the second day onwards we use the returns on the stock (non-warrant) components.<sup>13</sup>

#### 4.1. Post-issue revenue growth

There are substantial differences in revenue growth rates in the first year following the IPO. The median US issuer increased its revenue by nearly 55%, whereas the corresponding figure for local issuers was less than 15% (17% for local IPOs in electronics and software). This finding is consistent with the view of firms that firms listing in the US are of higher quality, although it is not clear if this growth differential continues in the longer run.<sup>14</sup>

#### 4.2. First day returns

We begin with first day returns of Tel Aviv IPOs relative to the index of total return for all TASE stocks. Local IPOs differ from those of many other countries in that on the first days of trading returns are not significantly greater than zero, that is, there is no underpricing. More striking, however, is the difference in performance between the local Israeli IPOs and Israeli IPOs in the US: On the first day of trading, prices of US issuers rose on average by about 20%. Only in four issues did share prices fall on the first day. We conclude that underpricing constitutes an important cost of listing in the US.

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<sup>13</sup> With one exception, the stock component varies between 65% and 86% of the bundle value at the end of the first day of trading. One company for which the relative size of the bundle components at the IPO is unclear is excluded from the analysis. All of the results reported below remain unchanged when firms that issued “bundles” are excluded from the sample.

<sup>14</sup> We have incomplete data on revenue growth of firms that list in the US in the second year after the IPO. The available data suggest that US issuers grow faster than firms that list in Tel Aviv, but their growth rate is similar to that of Tel Aviv IPOs in electronics and software. Higher post-issue growth rates are reported also in Pagano et al. (1999) for European companies that *cross-list* in the US.

### 4.3. Long-term returns

We use Ritter's (1991) methodology to calculate cumulative long-run abnormal returns for the US and Tel Aviv samples of IPOs.<sup>15</sup> During a three-year period following their offering, the Tel Aviv new issues underperformed the local market by about 24% (in US dollar terms). Similar findings are reported in Ber et al. (2001). Disappointing long-term returns on IPOs are, of course, not unique to Israel (Ritter, 1991; Loughran et al., 1994). Yet Israeli IPO returns are different from US IPOs in that they produce low returns over time *without* producing offsetting high abnormal returns on the first day of trading. Underperformance was common to IPOs of all sizes, and also to several industries. Table 4 shows that IPO underperformance was also common to several "cohorts". In particular, underperformance was probably not due to the alleged poor quality of IPOs during the "hot market" of 1992–93, since local issues underperformed in periods of market upswings as well as downswings. When the market rose dramatically in 1992 and 1993 (a period when stock prices rose at an annual average rate of 50% in US dollar terms), share prices of new issues rose but at considerably lower rates. When the market fell, IPO prices fell by even more. Table 4 also suggests that the high-tech sectors (electronics and computers) exhibited particularly dramatic underperformance. Finally, underperformance is unlikely to be a small stock phenomenon, because small-cap issues (all but 12 IPOs) did not perform well even relative to the Small Stock ("Karam") Index.

The striking differences in returns between Israeli firms that issue in the US and local IPOs are displayed in Table 5 (where the first day returns are excluded) and in Fig. 1 (which includes first day returns). Although it is not clear

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<sup>15</sup> Ritter defines the abnormal return for firm  $i$  in month  $t$  as the difference between the return on the firm's equity and the market return. Average abnormal returns in that month are then calculated using all the sample firms, and average cumulative abnormal returns are the sum of the average monthly abnormal returns. Note that this method assumes "re-balancing" of the portfolio every month, so that gains or losses in previous months are ignored, and each month begins with an equal investment in all IPO cohorts. An alternative assumption is that investments are made in the first month and cumulative returns are based on a "buy and hold" assumption, namely that the shares are held from the IPO for  $s$  months. This method yields qualitatively similar results, except that the performance gap described below between US and local IPOs is even bigger. It is also possible to calculate cumulative abnormal returns relative to returns predicted by the CAPM model (e.g., see Ber et al., 2001). This method yields similar results for the sample of Israeli IPOs. Finally, many studies calculate abnormal returns relative to some "reference portfolio". For example, Brav and Gompers (1997) divide all listed firms into "cells" according to characteristics such as size and industry, and compare the stock performance of every IPO firm to the performance of the portfolio of traded firms that constitute the corresponding cell. This method is not feasible in our case because of the relatively small number of manufacturing firms traded on the Tel Aviv Stock Exchange prior to the IPO wave of the 1990s. For further discussion of the various approaches and difficulties in measuring abnormal returns, see Lyon et al. (1999).

Table 4  
Long-run post-IPO returns for Tel Aviv IPOs<sup>a</sup>

	Three-year post-IPO abnormal returns
All IPOs ( $N = 162$ )	-24.5*
Straight equity IPOs ( $N = 127$ )	-23.2*
IPOs in 1990–91 ( $N = 12$ )	4.7
IPOs in 1992–93 ( $N = 115$ )	-22.7*
IPOs in 1994–96 ( $N = 35$ )	-40.1*
IPOs in electronics and computers ( $N = 55$ )	-31.8*
Small stock IPOs relative to the small stock (“Karam”) index ( $N = 151$ )	-10.4

<sup>a</sup>Cumulative abnormal returns calculated in US dollar terms relative to the Tel Aviv index (except where otherwise noted) for three years following the IPO. All figures exclude first day returns, which are insignificantly different from 0 on average.

\*Statistically significant difference from 0 at the 5% level.

to what market benchmark should returns on US IPOs be compared (the S&P, the TASE, etc.), it is clear that US IPOs perform much better than TASE IPOs.<sup>16</sup> US issues offer far higher returns than TASE issues and this is not merely due to high first day returns. During our period of observation, three-year returns on US IPOs exceed the TASE index by over 16% even when the first day returns are excluded, while the comparable figure for local IPOs is minus 24%.<sup>17</sup> These large differences in post-issue returns are unlikely to be merely due to differences in risk, because bankruptcy rates among US issuers are low.<sup>18</sup> Furthermore, absolute returns on local IPOs were close to zero (in US dollar terms), so that even though we can only observe these ex-post measures of risk it is rather hard to argue that local issuers are ex-ante safer investments with low risk.

The fact that US issuers exhibit superior performance both in terms of stock returns as well as in terms of revenue growth rates implies that US investors are indeed able to identify superior Israeli firms and are not just “overoptimistic” about technology companies. Our results suggest that there is a segmented market for Israeli IPOs: Higher quality issues of innovative firms go to the US

<sup>16</sup> This is despite the fact that US IPOs underperform relative to the S&P index much like Ritter’s (1991) sample of American IPOs.

<sup>17</sup> To make sure that our results on are not driven by a few extreme observations, we exclude one US issuer with extremely high positive returns. We also follow the NASDAQ rule that share prices should be above \$1 and exclude US issuers when their share prices fall below this threshold. There are five such cases in the sample, four of which are firms in financial distress (see below) and one is a firm that recovers after the end of our sample period.

<sup>18</sup> Out of the entire sample of US issuers, only four firms were de-listed because of financial failure. Four other firms ceased trading after being acquired at prices above their IPO levels.

Table 5  
Long-run post-IPO stock returns<sup>a</sup>

Months	US IPOs minus the TASE Index	US IPOs minus the small stock index	US IPOs minus the S&P index	Local IPOs minus the TASE index	Local IPOs minus the S&P index
1	1.54	1.14	1.20	1.19	0.95
2	5.31	4.87	5.41	2.23	1.72
3	8.27	7.61	7.99	2.92	1.95
4	6.06	5.01	4.78	0.72	-0.57
5	8.81	8.73	4.31	0.35	-1.56
6	6.26	6.71	2.57	0.28	-4.43
7	1.98	2.08	-1.82	-0.85	-7.95
8	1.97	2.29	-2.80	-1.68	-8.38
9	0.95	1.23	-4.97	-3.73	-13.40
10	2.43	2.08	-3.98	-4.70	-15.79
11	4.50	4.42	-1.24	-6.07	-16.75
12	5.50	5.72	-0.51	-8.56	-23.53
13	3.64	3.72	-4.18	-8.90	-27.07
14	5.29	5.81	-2.48	-9.95	-28.80
15	2.57	3.43	-7.12	-9.71	-31.72
16	4.10	5.51	-8.55	-12.37	-34.00
17	5.36	6.19	-8.87	-13.56	-35.09
18	5.31	6.84	-9.19	-16.39	-42.42
19	9.46	11.62	-6.06	-14.50	-40.92
20	6.03	9.45	-11.08	-14.99	-42.88
21	2.74	6.42	-15.64	-14.55	-47.01
22	0.50	4.62	-19.94	-14.02	-48.59
23	0.99	8.43	-22.30	-15.42	-51.06
24	0.20	8.10	-25.62	-17.91	-57.40
25	-2.40	3.93	-29.71	-17.11	-59.16
26	4.28	15.13	-25.45	-17.15	-61.85
27	6.94	17.09	-22.51	-16.66	-62.81
28	6.59	17.94	-25.86	-18.31	-65.50
29	5.01	18.77	-29.01	-19.34	-69.28
30	2.17	16.03	-31.62	-20.45	-74.65
31	9.85	22.24	-27.03	-20.83	-75.72
32	4.33	19.45	-34.77	-21.13	-77.49
33	5.78	24.59	-34.40	-20.94	-82.03
34	12.38	33.81	-30.19	-21.34	-84.41
35	13.04	30.79	-29.97	-22.21	-87.10
36	16.14	35.87	-27.64	-24.47	-91.92

<sup>a</sup> Three year cumulative abnormal returns in US dollar terms, excluding first day returns.

(“if you can make it there, you’ll make it anywhere”) while lower quality firms stay home.

Why, then, do Israeli portfolio investors continue to purchase lower-quality IPOs issued in Tel Aviv? How is this separating equilibrium sustainable over time? One possible explanation is related to the structure of the financial system in Israel. Commercial banking is highly concentrated, and the universal banks

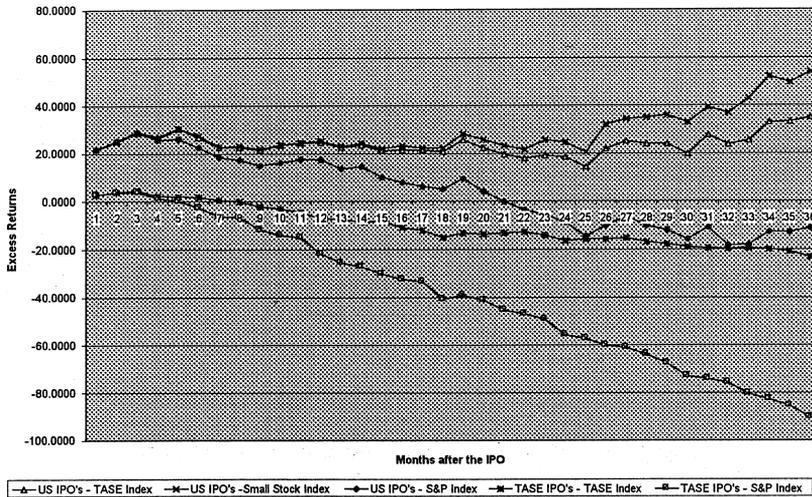


Fig. 1. Post-IPO returns. All figures are in US dollar terms and include first day returns.

operate as merchant banks, underwriters, brokers, investment advisors, and investment fund managers. Ber et al. (2001) show that banks in Israel were heavily involved in the local IPO process during the 1990s both as underwriters and subscribers. They argue that conflicts of interest may have resulted in low returns to investors, who typically purchased local IPOs through their bank-managed provident or mutual funds, and could not easily change the composition of their portfolio.<sup>19</sup>

In order to verify that our empirical findings regarding the characteristics of firms that list in the US are not due to Israel-specific factors, we examine all 10 Dutch IPOs in the US between 1990 and 1996 and compare them with the 15 IPOs of manufacturing and software companies in Amsterdam during that period. Despite some important differences between the Israeli and Dutch IPOs in the US,<sup>20</sup> it is interesting to note that *all* 10 Dutch IPOs in the US are in high-tech industries, including biotechnology, electronics, and software, while firms issuing shares in Amsterdam are not. As in the case of Israeli IPOs, pre-IPO growth rates are significantly higher for firms listing in the US. Moreover, underwriters for Dutch companies that go public in Amsterdam are local, whereas Dutch companies that list in the US underwriters always use well-

<sup>19</sup> They also argue that bank underwriters tended to overprice new issues, a feature that could help explain some of the difference in returns between local and US IPOs.

<sup>20</sup> Dutch IPO firms are much larger than their Israeli counterparts. Furthermore, unlike Israeli firms, the majority of Dutch companies issue equity simultaneously in Amsterdam and on NASDAQ.

known American investment houses, a pattern that resembles our findings for Israeli IPOs in the US. Pagano et al. (1999) similarly report that European firms that *cross-list* in the US also tend to be relatively high-tech and fast-growing companies. The phenomenon of innovative firms signaling their value by going public in a major rather than a local exchange is therefore not specific to Israel, and may be generalized to other economic environments.

## 5. Concluding remarks

We have argued that Israeli IPOs in the US are composed of young, innovative firms, in need of certification of their value. This is a plausible reason why promising firms are willing to pay the costs of underpricing and of selling a large fraction of their equity in order to access NASDAQ and have their value revealed upon listing. Thus, our findings suggest the existence of a separating equilibrium, whereby high-quality IPOs opt for US equity markets, while less-promising firms remain in local markets, and this is not necessarily a result of disclosure requirements. As with all signaling models, it is possible to argue that other “money-burning” activities could provide an equally valid signal. We believe that additional benefits associated with listing in the US make this argument implausible. One such benefit from listing in the US is investor recognition.<sup>21</sup> Other potential benefits that firms may derive from listing in the US are visibility and name recognition among potential clients, which are probably valuable to the overwhelmingly export-oriented population of US issuers.

Finally, the preference of Israeli high-tech companies to use Wall Street rather than the bank-dominated capital market at home fits the Allen (1993) and Carlin and Mayer (1999) view that bank-based financial systems are less suitable than large stock markets for the task of financing innovation. Yet there are signs that globalization may force local stock markets to change. In July 1999 a well-known internet company went public on the TASE for the first time, using a non-bank underwriter and underpricing its shares. This anecdote, together with public statements by the TASE authorities, suggests that Israel’s capital market institutions (the stock exchange, underwriters, etc.) as well regulators are making an effort to adapt and slowdown the flight of high-tech IPOs to the US. The long-run equilibrium of this process is still unclear.

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<sup>21</sup> Huberman (1998) suggests that “familiarity breeds investment” (investors are more willing to purchase equity of firms they know). The fact that Israeli companies listing in the US are young and relatively unknown, as well as their disperse post-IPO ownership structure, suggest that Israeli firms use their US IPO as a mechanism to attain investor recognition. Indeed, Kadlec and McConnell (1994) argue that name recognition among potential investors is more easily achieved the larger is the number of investors holding the firm’s equity.

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