# International New Ventures:
# An Empirical Analysis of Some Basic Characteristics

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**ABSTRACT**

The label 'International New Ventures' has been used to designate firms, which from their inception are oriented towards the international market place. The present article aims to test empirically whether such a type of manufacturing firms differ from comparable firms with respect to some basic characteristics. The motivation for doing so is to evaluate the usefulness of studying International New Ventures as a distinct form of economic organization.

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## INTRODUCTION

In the international business literature, global forms of organization have almost exclusively been associated with large multinational enterprises (MNE's). Recently, Eden and Lenway (2001) view the MNE as the embodiment of globalization and its principal agent, and note that multinationals have been the prime movers behind globalization. They argue that MNEs facilitate globalisation because they are linked to domestic as well as international markets, and because they constitute investment 'bridges' between economies. However, during the last decade advances in production, transportation and communication technologies have facilitated access to international markets, and it has become much more manageable for smaller firms to pursue a deliberate, global strategy. At the same time increased globalisation and specialized customer needs have 'pulled' many new business ventures towards international market niches. As a consequence, many industries at the present day exhibit quite diversified production, distribution, and marketing networks in which firms may be linked to, and participate in global networks, which facilitate international flows of activities within an industry or a market.

Participation in international or global business networks may take place very quickly after the birth of a firm. Such fast internationalizing firms have been labelled 'Born Globals' (Knight and Cavusgil, 1996) and 'International New Ventures' (Oviatt and McDougall, 1994). In this article we adopt the latter label because the firms in our empirical study represent all four types of such ventures as outlined by Oviatt and McDougall. Our operationalization of this type of firms, however, takes its starting point in Knight (1997). So, we build on the research paths of international business as well as entrepreneurship which is in line with McDougall and Oviatt (2000) who argue that these paths are intersecting more and more because an increasing number of firms seek international competition advantages very soon after inception.

As we will see, previous research has brought evidence that such firms differ from other manufacturing firms regarding their managerial outlook, internationalisation paths, and other behavioural measures. Previous research has thus indicated that these firms are worth studying if the research interest lies in assessing managerial attitudes or actual behaviour on international markets. From a managerial perspective, and in order to infer effective export promotion strategies, International New Ventures (INVs henceforth) appear interesting and

seem worth further study. From the perspective of theory, however, it is intriguing to know whether the apparent distinct characteristics of these firms are just surface phenomena or reflect more basic characteristics. If so, they merit study as a distinct form of economic organization.

The present article contributes by developing an empirical profile of this type of firm that goes beyond the assessment provided by previous research. The objective is to test whether INVs differ from other firms with respect to asset configuration and speed of learning. Hypotheses are formulated and subsequently tested on a Danish sample in which INVs are contrasted with a comparison sample of other manufacturing firms. The motivation for doing so is to add to the knowledge about these firms in order to evaluate whether it is useful to categorize them as a distinct form of economic organization.

The article is organised as follows. First, we provide an brief overview of previous findings concerning internationalisation processes and the INV type of firm. Second, we formulate hypotheses according to which INVs should differ from other companies. Third, we present the data and measures used in the empirical analyses. Fourth, we use repeated measures ANOVA analysis as well as non-linear regression analysis to test the hypotheses. A discussion of the findings and their implications concludes the article.

## PREVIOUS FINDINGS

Traditionally, the internationalisation of the firm has progressed in a slow and gradual process through which the firm has increased its geographical scope as well as its commitment to foreign markets. Such stage-wise internationalisation patterns have been demonstrated in early studies in Europe (Johanson and Wiedersheim-Paul, 1975; Johanson and Vahlne, 1977) as well as in the US (Bilkey and Tesar, 1977; Cavusgil, 1980), and led to the formulation of the stages model of internationalisation. Andersen (1993) provided an excellent review and evaluation of the stages models.

During the last decade, however, empirical observations have increasingly contradicted the stages models. Thus, several articles published during the 1990's showed that even newly established firms may nowadays be internationally, or even globally, oriented right from their inception (Jolly et al, 1992; McKinsey & Co., 1993; Oviatt and McDougall, 1994; Bell, 1995; Knight & Cavusgil, 1996). McKinsey & Co (1993) labelled such firms 'Born Globals' and characterized them as firms that view the world as their market place right from the outset. Knight and Cavusgil (1996) note that Born Global firms tend to be managed

by entrepreneurial visionaries who view the world as a borderless marketplace. Oviatt & McDougall (1994) labelled this type of firms 'International New Ventures.' Their definition is broader than McKinsey & Co's (1993) since it also includes the sourcing side: 'We define an international new venture as a business organization that, from inception, seeks to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries. (p.49)' In the literature, it is emphasized that such firms must be seen as a challenge to the traditional stages theories of internationalisation (Knight & Cavusgil, 1996), and to the theories of the MNE (Oviatt & McDougall, 1994).

Fast internationalisation may be explained by entrepreneurial skills and mindset, or it may be motivated by developments in the environment which create push or pull effects. There is wide agreement with regard to the environmental factors giving rise to the phenomenon of Born Globals or International New Ventures. Advances in transportation and especially communication technologies have facilitated the possibility that all firms, even new and very small ones, may explore and exploit business opportunities at a low cost all over the world. Due to a more internationally oriented world, the quantity and quality of people with international (business) experience is much higher now than just ten years ago. Such external factors have smoothed the way for global strategies in newly established firms. The required minimum initial investment needed to enter a new country market has diminished, an effect which is also caused by advances in production technology that has rendered small-scale production much more efficient than earlier. More specialization is one of the consequences, which in turn fosters an increase in niche markets in which products become increasingly homogenous across countries. Furthermore, firms may have to follow their customer if they go international. Such external factors may have forced many newly established firms to be internationally oriented right from their inception.

Authors focusing on the INV type of firms have noted that they appear to be different from other types of exporters. These firms' domestic markets are not important 'learning places' as assumed in traditional internationalization theory, and the theory about the emergence of MNE's. In accordance with the definition of the phenomenon, INVs start international activities soon after their birth, and many very quickly reach a high level of foreign sales in a high number of foreign countries, including distant ones. They may draw upon financial funding in one country, have their headquarters in a different country, and their R&D in yet another country. They may operate independently or build on competences of partners or independent intermediaries in business networks. Oviatt & McDougall (1994) note

that INVs often control rather than own assets that create value in more than one country. For these firms foreign direct investment is not a commonly used mode of access to international markets. Rather strategic alliances or other control mechanisms such as licensing or social control in networks are the more commonly used alternatives. The choice of such control modes may be explained by the fact that newly established firms do not have the (financial or human) resources to obtain control through ownership in multiple countries which necessitates the use of arm's length governance. Another reason may be that an increasing number of firms offer such collaborative opportunities.

Zahra et al (2000) emphasize that new ventures may gain competitive advantages over larger, more resource-endowed firms if the former are able to market innovations faster. Increasing their technological learning may be one path to follow. The authors bring evidence that such learning is better facilitated by high-control modes such as acquisitions than by lower-control modes such as exporting. This may pose a problem for INVs since they often operate on arm's length as mentioned above. However, Zahra et al do not examine the degree of marketing and organizational learning which may be better obtained through lower-control modes.

## HYPOTHESES

In the ensuing we develop two hypotheses which both contend that INVs quickly develop activities in many geographical markets, and often operate on arm's length in their marketing channels. As mentioned above, these two characteristics are highlighted in the literature about the phenomenon, and they are very intriguing because they are contrary to the normative implications from traditional stages models of internationalisation. For example, Johanson and Vahlne's (1977) 'State and Change Aspects' model internationalisation emphasises the gradual acquisition, integration, and use of foreign market knowledge. This model would prescribe an export behavior favouring the deep penetration of one geographical market, gaining experience before moving to the next one. In a similar vein Eriksson et al (1997) argue that experiential knowledge of foreign markets is central in explaining the firm's internationalisation process, and that such knowledge "requires durable and repetitive interactions abroad. Sporadic interaction with markets actors abroad produces little experience" (p. 354).

Clearly, INVs often do not behave according to the normative implications drawn from traditional theories. They typically face market conditions that require immediate

learning of how to market products in varying environments and probably through different marketing channels. At the same time they have to establish and manage a new organization. As a consequence, INVs have to be able to learn or exploit knowledge faster than other firms. According to Autio et al (2000) early internationalizers do have the opportunity for doing so, because they do not have to unlearn routines related to domestic markets, nor to limit themselves to a narrow set of opportunities in international markets. The authors see the ability of quick learning as being potentially more important than long time experience and note that "In short, we believe that the survival and prosperity of born-global firms may be explained by their ability to adapt to and innovate more rapidly in new and dynamic environments than would ordinarily be the case for older firms" (Autio et al 2000, p. 919). So, following the authors mentioned as well as Zahra et al (2000) we argue that quick international expansion facilitates learning and exploitation of knowledge in organizations. This may take place through the exploration of new knowledge or through the exploitation of existing knowledge inside the firm or of knowledge possessed by collaborative partners or intermediaries in the market place.

So, we suggest that in order to survive, INVs must learn faster than the average firm. They must be more talented in exploring new opportunities and/or in exploiting knowledge possessed by external partners. By contrast, if INVs are slow learners, they will tend to be 'selected' out of the market. The findings of Zahra et al (2000) seem to indicate the speed of technological learning has an inverted U-shape, meaning that entering diverse foreign markets may have a positive effect, but that attacking too many markets at once could produce an 'information overload' with respect to technological learning. Since we are interested in learning in general and our population is mainly active on the European markets (not too many or different markets) we just hypothesize that INVs learn/exploit knowledge faster than other firms. This leads to the first hypothesis:

*H1. International New Ventures learn/exploit knowledge faster than other firms*

Fast learning, exploitation of the knowledge possessed by oneself or others, and internationalisation may be associated with a particular asset configuration. In comparison with other manufacturing firms, we expect INVs to have a lower proportion of fixed assets (mainly tangible assets such as buildings, machinery, and equipment, but also patents rights and stock in subsidiaries) relative to current assets (stocks of goods, outstanding debts, and

liquid assets). As mentioned INVs are often reported to operate on arm's length, which should be associated with lower investments in fixed assets, as we discuss below. Basically, INVs may be forced to invest less because of their limited resources. As argued by Oviatt & McDougall (1994), such firms will internalize a smaller fraction of their resources than other (mature) firms.

However, applying a transaction cost approach may shed some more light on their reasons for buying rather than making. An INV typically builds on competences relevant for only a smaller segment of customers. Such a firm specializes in meeting the needs and wants of niche segments which must be expected to be quite similar across country markets. Hence, in each particular country market the asset specificity necessary for doing such business is probably not high which favours lower-control modes of entry. Also, the relative frequency with which the INV has to solve business related tasks in a particular country market is typically low, because the INV often has a low market share in each country market. Finally, due to the technological developments mentioned earlier, the costs of 'running the export marketing system' have gone down over the last two decades. Al of these factors would predict greater use of external markets according to a transaction cost analysis. Similar arguments are relevant for the sourcing side of INVs.

So, INVs may compete on a basis that requires 'fungible' assets (Teece, 1982) in the form of knowledge that can be specialized to different products, production processes, partners, distribution channels and customers as opposed to a large stock of fixed assets. Such a firm may therefore have to dedicate investments to 'markets' and 'people' rather than accumulating large stocks of fixed assets. This is not to say that an INV refrains from *handling* tasks that require a large installed base of fixed assets. The point is that such tasks will usually be outsourced to partners.

It follows from the above discussion that INVs cannot in general be expected to possess a large portfolio of fixed assets. Rather, they rely on specialized knowledge, which is based on human resources. Many small high-tech firms that compete internationally use local and international networks to compensate for low levels of fixed assets in production or R&D (see e.g. Keeble et al., 1998). So, compared with other firms, we expect that INVs have a lower share of fixed assets relative to total assets.

*H2. International New Ventures have a lower share of fixed to total assets than other manufacturing firms*

According to H1, the 'fast learning hypothesis,' INVs are more light-footed than other firms, and according to H2, the 'low fixed assets hypothesis,' this characteristic is associated with a particular asset configuration. This also follows from Oviatt & McDougall's (1994) arguments concerning such firms' ability to overcome the potential disadvantages they face when competing with indigenous firms on foreign markets. Whereas large MNEs may overcome such potential disadvantages through their prior investment in scale or scope, this avenue is not open for INVs due to their small size and limited resources. In view of the small size, Oviatt & McDougall argue that the most obvious location advantage for these firms is private specialized knowledge, which may be very portable due to the modern advances in communication and transportation technology. In order to provide further profiling of the asset configuration of INVs, we supplement the test of H2 with an analysis of the number of employees and a test using the traditional measure of technology intensiveness (the logged ratio of capital to labour).

In the following, we will present the data and measures used to test these hypotheses and then turn to the empirical analyses.

## DATA AND MEASURES

The empirical study is an extension of previous survey studies of Danish manufacturing companies including all manufacturing industries as their target population. The data used in the present study covers the population of companies with more than 10 employees that are not subsidiaries of other firms. We only consider firms founded after 1976, since tihis was the cut-off point in our previous research. This cut-off point is somewhat arbitrary, but it coincides quite well with the emergence of the new technologies mentioned earlier which facilitated the internatioanlization processes of firms. So, focus is on firms established within a contemporary, international business environment. The data were obtained from the electronic database, CD-Direct, a purveyor of credit information about businesses. This database contains the publicly available accounting data and information about industry participation, number of employees, and founding year. Due to Danish legislation concerning the privacy of information about individuals, CD-Direct is only allowed to keep data for a five-year period. We gathered data for the period 1994-1997. The firm's industry membership was decided on the basis of the most recent year in the data set, 1997.

As explained below, one criterion used to categorize a firm as a INV is that it must be established after 1976. In order to control for possible founding effects (Hannan & Freeman, 1989), the comparison sample was defined as all Danish manufacturing firms with more than 10 employees founded after 1976. The comparison sample thus includes a total of 3.281 manufacturing firms established after 1976. Due to missing data the effective sample was reduced to between 3.261 and 2.689 firms (see Table 1, below), depending on the items included in the analyses. Thus, at least 82% of all Danish manufacturing firms founded after 1976 are included in our analyses. For analyses on sales data, the missing data resulted in an effective sample of 818 firms (25%), an issue to be addressed in the ensuing. Furthermore, the data need to span multiple years in order to provide a comprehensive test of the learning hypothesis (H1) and the variance hypotheses (H3 and H4). In view of these considerations, we use a time-series (1994-97) of financial data as measures for the constructs included in our empirical test.

In order to test the hypotheses, INV firms should be identified. Since Oviatt and McDougall (1994) do not offer an operational definition of the phenomenon, we adopted a more rigorous edition of the most widely used, operational definition of Born Global firms suggested by Knight (1997). This means that we categorized a firm as a INV if it was established after 1976, started international activities within one year (rather than three years as suggested by Knight) after its inception, and obtained a share of foreign sales of 25% or higher within the first year after inception (rather than over a life time as suggested by Knight). We chose this much more rigorous definition because Denmark is a small country which forces many firms to quick internationalisation. Hence, we felt that the criteria for being labelled 'INV' should be stronger than for firms in large countries like the US.

The first two criteria could be obtained from the official registration in CD-Direct. Using additional data from previous survey studies, we had the necessary information about the identity of firms in a particular region of Denmark. All the manufacturing and exporting firms in this region were contacted by telephone in the previous study and asked if they if they had 25% or more in foreign sales, which was the case for 144 firms out of a total of 488 manufacturing firms established after 1976 in that region. These 144 firms could then be labelled 'INVs,' following the above-mentioned definition. Due to missing data the effective sample of INVs was reduced to between 93 and 124 firms, depending on the items included in the analyses. The analyses on sales data for INVs especially suffered from missing observations. Thus, excluding two outliers, we only had sales data across all years for

eighteen firms in the INV sample. Since sales data were used to estimate learning rates, these should be generalised to the sample with great caution, a problem to be considered in detail in the following.

Since INVs were identified only in a particular region of Denmark, we do not know the number of INVs in our comparison sample. Assuming that this particular region is representative for the whole country, about 25% of the firms in our comparison sample are INV firms themselves. This implies a higher probability for rejection of our hypotheses – differences between INVs and other firms must be quite strong in order to accept the hypotheses.

Firms in our sample are not only high-tech firms, but come from a broad set of industries. Oviatt & McDougall (1994) identify four types of INVs depending on the number of countries these firms have entered and the number of value-chain activities they coordinate across countries. According to this classification most of the firms in our sample should probably be categorized as 'Geographically Focused Start-up's.' In-depth case studies of 21 of the firms in our sample reveal that most of them would focus on relatively few, large country-markets, but on the other hand 30-40% of them would be 'Global Start-up's', seeing the whole world a s their market place.

Both in the case of INVs and the comparable manufacturing firms, data on the following measures were obtained in order to test the hypotheses:

*Share of fixed to total assets*. FA/TA: The Fixed Assets divided by Total Assets in a fiscal year. Data were obtained for each year in the period 1994-97.

*Learning rate*. We fit data on sales (actual market-valued output) for the period 1994-97 to a simple learning model. Provided a sufficiently good model can be formulated (in terms of explained variance), we may use the estimated coefficients of this model as a proxy for the learning rate of a particular group of firms, e.g. INVs.

A brief justification for the two measures may be in order. We use the measure of fixed to total assets to tap whether the firm has dedicated its assets to a particular purpose for a longer period of time (a high FA/TA ratio) or whether it has declined to do so (low FA/TA ratio), as would be the case if the primary basis for the activities were human resources.

As suggested by Ghemawat (1991), as well as the literature on learning (Argote, 1999) and technical change, the actual value of sales may be used as a proxy for firm-specific learning. In the present study, we further develop this idea and fit sales data to an explicit learning model in order to obtain estimates of learning rates for INVs and for all other

manufacturing firms in the comparison sample. Our estimate of learning rates assumes that economically relevant learning is always expressed as increases in the book value of the firm's sales. This procedure should work unless learning despite being economically relevant for some reason is never expressed in terms of increases in the book value of sales, i.e., if the sale of some output is never registered. We shall rule out this possibility since it indicates illegal practice. Of course, changing accountancy standards, both at the industry- and firm-level, may bias the estimated learning rates. If the time-series used to estimate learning rates is considered a random sample of a large number of years, and if the number of firms included in the sample is large, the probability that a bias is present at the firm level in a particular time-series is very small. Since our data include a large number of firms, we do not expect that our estimates will be plagued by a severe bias. As we will discuss later, however, we have a very small sample of INVs, which limits the generalisation of our findings.

## ANALYSES

Table 1 shows the descriptive data. Based on preliminary outlier analyses we excluded extreme observations (mean ROA +/- 3 std.dev.). The results reported in the ensuing are robust towards defining a lower limit for the exclusion of outliers. Including the very few extreme observations outside the limit of mean ROA +/- 3 std.dev., however, completely alters the results for each additional outlier included in the analysis. Since we are interested in generalizeable results, we only report results from analyses where the extreme observations have been excluded.

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Table 1 about here

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According to the data shown in Table 1, it appears that INVs, during all years in the period 1994-97, have less employees, higher sales, lower performance, a lower share of fixed assets, and a higher capital to labour ratio. INVs also seem to have less variation in employees, sales, and performance. In the following, we proceed with the analyses and use repeated measures ANOVA modelling to test H2-H4. We first report the results from these analyses, and subsequently report the estimation of learning rates conducted to test H1.

### *Results of the Repeated Measures Analyses*

Since our data span observations across four years, each subject (firm) comes with four observations. To effectively separate cross-subject variation from time effects, we use an ANOVA within-subjects design to take advantage of our repeated measures data. A brief account of this procedure is provided before we report the results.

We refer to the effects that come from variation in a measure across years as within-subjects effects. The purpose of the ANOVA within-subjects design is to test for significant changes in the subject profile over time. More precisely, it is tested whether the slope of adjacent measures ($t_{0+i}$) differs for each of the subjects. This effect is tested for the entire sample and referred to as a 'year effect.' Also, we test whether there are significant differences in year effects for INVs and the comparison sample. In practice, testing if the interaction-term between year effects and the grouping variable (including INVs versus other firms) is significant will accomplish this. A significant interaction term indicates that the variation in a measure across time differs for INVs and the other firms in the comparison sample. We report multivariate tests of the year effects and further employ the usual between-subjects design to test for differences across subjects for individual years. We employ Box's M to test for differences in variance across years between INVs and other firms. For individual years, we use Levene's test.

We first report the test of H2, the 'low fixed assets hypothesis.' As seen in Table 2a below, according to the test of within-subjects effects, no significant year effects were present. In other words, the firms' levels of fixed to total assets are not changing over the four-year period analysed in the present study. Moreover, the interaction effect between the year effect and the grouping variable was not significant. This means that there are no significant differences between INVs and other firms with respect to changes in the level of fixed to total assets across years.

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Table 2a,b about here

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The test of between-subjects effects shows that INVs and other firms do not differ significantly (at p=0.05) in their levels of fixed to total assets for individual years. Note that this additional information, that INVs and other firms do not differ across years, suggests that any (dis)similarity between INVs and other firms is persistent at least over the four-year

period analysed in the present study. Therefore, we reject H2. INVs do not have lower levels of fixed to total assets than other firms and there are no significant year effects.[1]

Table 3b above shows the results of the test of H3, that INVs have higher levels of variance in fixed to total assets than other firms. According to the Levene test, this hypothesis cannot be rejected for each year in the period 1994-97. Since Box's test shows a significant difference for INVs and the comparison sample across years, we conclude the variation in levels of fixed to totals assets differ between the two types of firms for individual years and across years. As can be seen from Table 1, the main source of these differences lies in a relatively high level of variance for INVs for the year 1996. Even if H3 cannot be rejected, the support for this hypothesis is weak. As mentioned above, we supplement the test of H2 with an analysis of the number of employees and the traditional measure of technology intensiveness (the logged ratio of capital to labour)[2].

The number of employees changes significantly (p= 0.05) over the four-year period analysed in the present study. Also the interaction between the year effect and the grouping variable is significant. The number of employees changes significantly, but the changes do not follow similar patterns for INVs and other firms. The between-subjects effects show that INVs and other firms do not significantly differ in the number of employees for individual years. As shown in Table 1, INVs increase the average number of employees from 1994 and 1995 (from 34.84 to 38.32) and then maintain this level for the remainder of the period. The comparison sample continues to increase the average number of employees over the entire period. Apparently, INVs at some limit (about 40 people) ceases to employ more people, whereas all other firms continue to grow. According to a Levene test, INVs and other firms do not differ in the variance of the number of employees for individual years. A Box's test, however, shows that they differ across all four years. As shown in Table 1, the variance in the number of employees increases in two 'jumps,' from 1994 to 95 and from 1996 to 97. For all other firms, there is only one 'jump,' from 1994 to 95.

The firms' level of technology intensiveness (asset profile) is not changing significantly (p= 0.05) over the four-year period analysed. The test of between-subjects effects show that INVs and other firms do not differ in their levels of technology intensity for individual years. In view of the absence of differences in year effects between the two groups of firms and since the interaction between the year effect and the grouping variable was not significant, the

[1] Note, however, that the between-subjects effects are significant at p=0.10 which reflects the fact that our sampled INVs have a lower share of fixed assets than the sample of other firms as reported in Table 1.
[2] These analyses may be obtained from the authors.

similarity between INVs and other firms is persistent over the four-year period analysed here. This result lends further support to the rejection of H2, there is no apparent difference between INVs and other firms with respect to their asset profile. Moreover, a Levene test shows that INVs and other manufacturing firms do not differ with respect to variance in technology intensity. Neither does a Box's test show any difference in the variance of technology intensity between INVs and the other firms when all four years are used for comparison.

Interestingly, the results in Table 3a below, show significant changes in performance over the four-year period analysed in the present study. Since the interaction between the year effect and the grouping variable is also significant, INVs and other firms differ with respect to these changes. This result indicates a possible difference in variance between the two groups of firms, speaking in favour of H4.

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Table 3a,b about here

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The test of between-subjects effects, however, show that INVs and other firms do not differ in performance levels for individual years. Therefore, it remains to be seen whether the difference in variance of performance was significant. According to the Levene test reported in Table 3b above, INVs and other manufacturing firms do *not* differ with respect to variance in performance for individual years. Neither does Box's test show any significant differences in performance variance between the two types firms when all four years are used for comparison. According to these results H4 must be rejected. INVs do not have higher performance variance than other firms in terms of variation over time. So far the results can be summed up as a largely negative verdict regarding any possible differences between INVs and other manufacturing firms. Now, we turn to the test of H1, describing the model and reporting the results of the non-linear regression analyses used to estimate learning rates.

### *Analyses of learning rates*

Since sales data were missing for a substantial number of firms in our sample, we examined the extent to which this influenced the test of H1 (where sales data are used). Since the test of all other hypotheses does not involve sales data, this possible bias will not influence conclusions on the test of any other hypothesis. Our sample included a total of 3.281

manufacturing firms with ten or more employees and 144 firms identified as INVs. We have financial data for 82% of the manufacturing firms, or more for some measures, but data on sales were limited to only 818 firms.[1]

To examine whether these 818 manufacturing firms systematically differed in characteristics from the firms excluded due to missing data, a series of ANOVA analyses were conducted.[2] The dependent variables were, for each of the four years 1994-97: ROA, total assets, fixed assets, number of employees (size). The independent variable was inclusion (presence of sales data) or exclusion (absence of sales data). Similar analyses were conducted for the eighteen INVs, which had reported sales data for all years.

For the manufacturing firms, there were no significant differences with respect to ROA and the fixed to total asset ratio, however, all other variables exhibited significant deviation ($p < 0,05$). The firms included on the basis of sales data had more employees and higher levels of total assets, fixed assets and current assets. The nineteen INVs, which had reported sales data did not differ with respect to ROA ($p < 0,05$). As in the case of manufacturing firms, we found that firms included on basis of sales data had more employees and higher levels of total assets and fixed assets. In view of these size-differences, we generalise our findings on learning rates and the resulting conclusions regarding H1 with caution. Having said that, the consistency in the differences observed across the two samples (INVs and other manufacturing firms), and since no differences in ROA were observed, we should not disregard the estimates as spurious.

We assume the following classical learning function as a stylised representation of firm-specific learning effects. In a strict sense the learning dynamics associated with learning by doing is described by what is commonly known as "the manufacturing progress function" (Argote 1999). In the present article, we infer the learning curve at the level of populations of firms (INVs versus other firms) in which case it is usually referred to as an 'experience curve' (Argote, 1999). Suppose that firm-specific skills at time $t+1$ are expressed in terms of the output-level $Z_{t+1}$, given by the following learning function:

$$Z_t = f(Z_{t-1}) = cZ_{t-1}^{a}$$

[1] According to Danish legislation, public disclosure of annual turnover is voluntary for smaller firms. Most of our firms fall into this category.

[2] These analyses can be obtained from the authors.

In this variant of the classical learning function (Argote, 1999), *a* and *c* are firm-specific coefficients. We do not estimate the relation between input and cumulative output, but rather use $Z_t$, the real valued cumulative number of units produced, as a proxy variable for economically relevant knowledge acquired through learning by doing. According to Argote (1999) this should result in more reliable estimates. A further reason for our choice of model specification is that we do not have data on input costs.

According to our model specification, if the coefficient *c* is significant and greater than unity, and the coefficient *a* is significant and positive, we can infer that learning has occurred. In order to estimate these learning rates, the above model was fitted to the sales data for the period 1994-97 in terms of the difference equation in the following explicit form:

$$Z_{97} = f(Z_{96})/4 + f(f(Z_{95}))/4 + f(f(f(Z_{94})))/4 + \gamma$$

Using this expression, the learning coefficients, *a* and *c*, and the error term $\gamma$ were estimated by non-linear regression. The $Z_{t-i}$'s were the sales data for our two samples.

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Table 4 about here

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We estimated learning rates for both the comparison sample and, as shown in Table 4 above, obtained an $R^2$ of 0.90 for INVs and an $R^2$ of 0.89 for the comparison sample, an excellent fit in both cases. In view of this very good fit and the fact that both coefficients (*a* and *c*) for the estimated learning rates were significant ($p < 0.05$), we conclude that the chosen learning model fits the data very well, both for INVs and for the comparison sample. Note here, that our estimation method ensures that the estimated coefficients of our learning model explains about 90% of the variance in output over the entire period 1994-97. Using the estimated learning coefficients *a* and *c*, Figure 1 provides a visual representation of the first 40 periods, for INVs and for all other firms.

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Figure 1 about here

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As Figure 1 shows, we cannot reject H1, 'the fast learning hypothesis.' INVs are clearly faster learners than the comparison sample during the first 33 periods (an estimated period is one year). It is further apparent that, after 33 periods, the comparison sample is outpacing INVs, and eventually reaches a higher level of output due to learning effects. Although we clearly

need more data to improve the reliability of the estimates, it seems safe to conclude that INVs are faster learners than other firms in the short run, but will be outpaced by other manufacturing firms in the long run.

## CONCLUDING REMARKS

The objective of the present article was to analyse whether INV firms differ from other comparable firms with respect to some basic economic characteristics, thus supplementing previous analyses that have demonstrated a difference between INVs and other firms manufacturing firms with respect to their manifest activities and strategies. As mentioned above, the results can be summed up as a largely negative verdict regarding differences between INVs and other manufacturing firms.

INVs are not significantly different from the comparison sample regarding the share of fixed to total assets (H2 rejected), and even if it cannot be rejected that INVs have higher variance in the share of fixed to total assets (H3 not rejected), the support for this hypothesis is weak. The supplementary analyses of possible differences in levels of technology intensiveness showed that INVs did not differ from the comparison sample. Neither did INVs differ with respect to variation in performance (H4 rejected). One significant difference, however, was that the comparison sample continued to increase the number of employees whereas INVs reached a level of employees that was maintained for the remainder of the period It is therefore questionable whether INVs merit study as a distinct form of economic organization from the perspective of theory.

Yet, our results of the test of H1, the ‘fast learning hypothesis,’ showed that INVs, in the short term, seem to be more light-footed than other firms. According to our results, the pace of progress is higher for these firms. Thus, our results indicate that fast internationalisation may be viewed as a cause of increases in learning rates, rather than in differences in asset configuration. According to Argote (1999), there are generally four sources of differences in learning rates: (1) increased proficiency of individuals (including managers, engineers and direct production workers), (2) improvements in the organization’s technology, (3) improvement in the organization’s structure, routines and methods of coordination, and (4) differences in organizations’ abilities to retain and transfer knowledge, an issue related to Cohen & Levinthal’s, 1991 notion of absorptive capacity. To further explore the underlying reasons for our findings regarding the differences in learning rates

between INVs and other manufacturing firms, future empirical research should therefore target these possible topics in comparative studies.

The present empirical comparison was based on observable economic measures and thus suggests that the INV is more light-footed but otherwise not a very different breed of firm. In previous work, we have argued that also from a theoretical perspective the indisputable increase of firms defined as INVs may be understood from existing theory (authors, 2001). Therefore, the phenomenon of INVs should perhaps be treated as an interesting new empirical phenomenon, which is readily understood when it is acknowledged that a number of factors have eased rapid access to international markets, especially during the last ten years of the 20$^{th}$ century. We find that understanding the sources of the ongoing co-evolution of the accessibility of the international markets, the vehicles of competition (access mode), and the (rapid) internationalisation patterns of business firms deserve further research. But we also believe that new phenomena, although deserving a fresh perspective, will usually not deserve a new theory. The results of the present study indicate that the INV is a case in point.

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**FIGURE 1: LEARNING RATES**

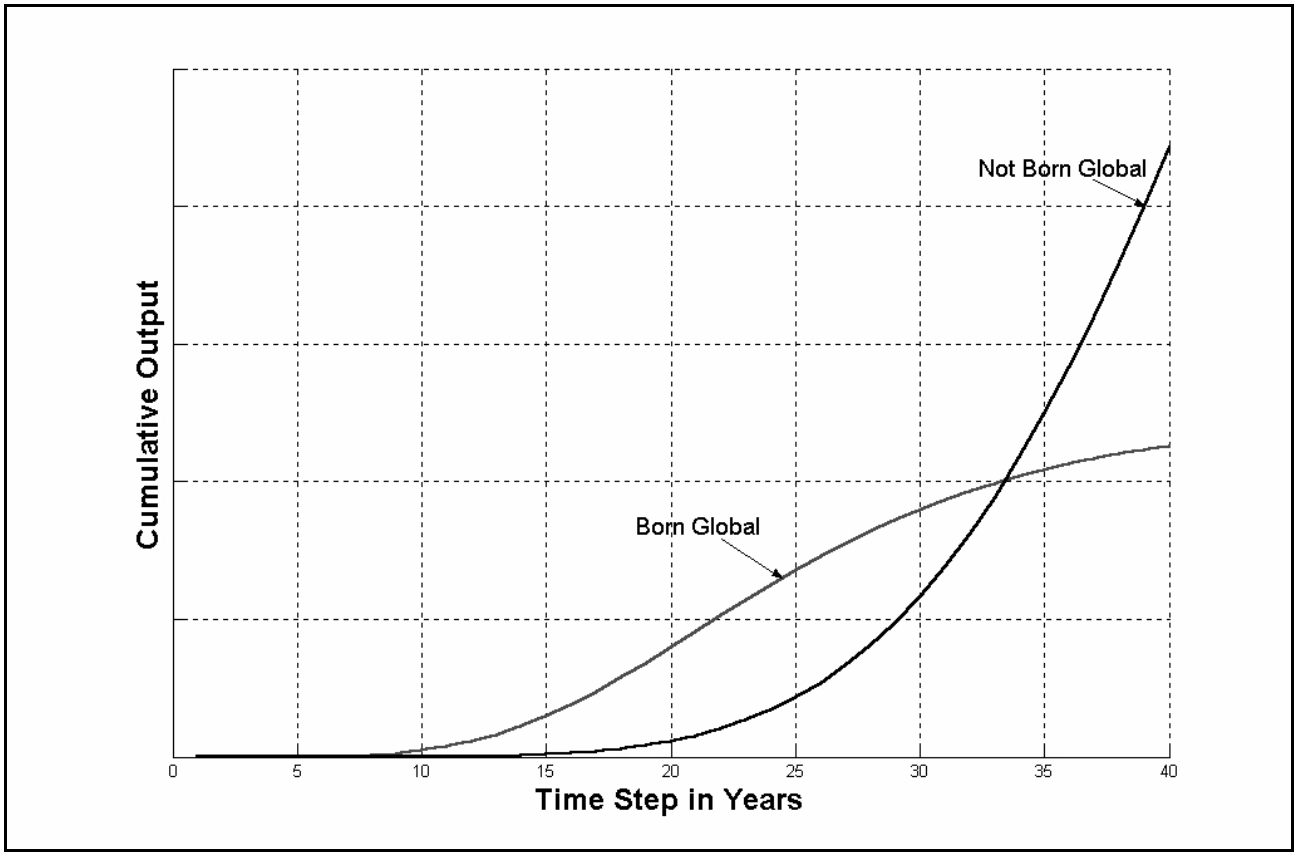

**TABLE 1**

**Descriptives**

| Year | | | Employees | Sales | ROA | FA/TA | Log(C/L) |
|---|---|---|---|---|---|---|---|
| **94** | **Not INV** | **Mean** | 41,96 | 78,08 | 8,25 | 0,40 | 2,67 |
| | | **Std.Dev.** | 74,47 | 130,62 | 13,20 | 0,22 | 0,30 |
| | | **N** | 2689 | 888 | 2811 | 2739 | 2656 |
| | **INV** | **Mean** | 34,84 | 70,84 | 8,97 | 0,36 | 2,72 |
| | | **Std.Dev.** | 34,62 | 75,29 | 12,67 | 0,21 | 0,28 |
| | | **N** | 110 | 28 | 93 | 93 | 109 |
| **95** | **Not INV** | **Mean** | 44,66 | 84,03 | 8,57 | 0,40 | 2,67 |
| | | **Std.Dev.** | 78,05 | 131,93 | 13,08 | 0,22 | 0,30 |
| | | **N** | 2839 | 880 | 2935 | 2884 | 2817 |
| | **INV** | **Mean** | 38,32 | 116,40 | 6,93 | 0,34 | 2,70 |
| | | **Std.Dev.** | 37,74 | 151,74 | 14,54 | 0,21 | 0,29 |
| | | **N** | 119 | 27 | 108 | 107 | 118 |
| **96** | **Not INV** | **Mean** | 45,87 | 92,86 | 7,95 | 0,40 | 2,68 |
| | | **Std.Dev.** | 79,99 | 151,74 | 13,37 | 0,22 | 0,30 |
| | | **N** | 2958 | 856 | 3039 | 2995 | 2935 |
| | **INV** | **Mean** | 38,29 | 86,84 | 6,15 | 0,35 | 2,71 |
| | | **Std.Dev.** | 37,57 | 86,32 | 13,85 | 0,26 | 0,31 |
| | | **N** | 124 | 28 | 112 | 112 | 124 |
| **97** | **Not INV** | **Mean** | 48,12 | 104,47 | 8,56 | 0,40 | 2,66 |
| | | **Std.Dev.** | 80,58 | 159,78 | 13,90 | 0,22 | 0,31 |
| | | **N** | 3261 | 818 | 3172 | 3137 | 3156 |
| | **INV** | **Mean** | 39,84 | 101,30 | 8,33 | 0,35 | 2,72 |
| | | **Std.Dev.** | 40,24 | 101,10 | 11,41 | 0,21 | 0,38 |
| | | **N** | 124 | 25 | 117 | 116 | 123 |
| **All Years** | **Not INV** | **Mean** | 45,31 | 89,55 | 8,33 | 0,40 | 2,67 |
| | | **Std.Dev.** | 78,48 | 143,96 | 13,40 | 0,22 | 0,30 |
| | | **N** | 11747 | 3442 | 11957 | 11755 | 11564 |
| | **INV** | **Mean** | 37,90 | 93,43 | 7,55 | 0,35 | 2,71 |
| | | **Std.Dev.** | 37,60 | 107,20 | 13,16 | 0,23 | 0,32 |
| | | **N** | 477 | 108 | 430 | 428 | 474 |

## TABLE 2a
## Repeated Measures Analysis: Fixed/ Total Assets

**Within-Subjects Effects**

| Source | | Sum of Squares | df | MS | F | Sig. |
|---|---|---|---|---|---|---|
| Year Effect | a | 0,00 | 3 | 0,00 | 0,07 | 0,98 |
| | b | 0,00 | 2 | 0,00 | 0,07 | 0,95 |
| | c | 0,00 | 2 | 0,00 | 0,07 | 0,95 |
| Year Effect * Grouping Variable | a | 0,00 | 3 | 0,00 | 0,07 | 0,97 |
| | b | 0,00 | 2 | 0,00 | 0,07 | 0,94 |
| | c | 0,00 | 2 | 0,00 | 0,07 | 0,95 |
| Error(Year Effect) | a | 280,39 | 36288 | 0,01 | | |
| | b | 280,39 | 27051 | 0,01 | | |
| | c | 280,39 | 27059 | 0,01 | | |

Probability that sphericity assumption is NOT violated: p= 0,00 (Mauchly).

a: Sphericity Assumed, b: Greenhouse-Geisser, c: Huynh-Feldt.

**Between-Subjects Effects**

| Source | Sum of Squares | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Intercept | 13,11 | 1 | 13,11 | 66,41 | 0,00 |
| Groupin Variable | 0,61 | 1 | 0,61 | 3,07 | 0,08 |
| Error | 2387,79 | 12096 | 0,20 | | |

**Multivariate Tests**

Year Effect: Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root: p= 0,95.

Year Effect * Grouping Variable: Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root: p= 0,95.

Grouping variable: INV versus all other manufacturing firms

## TABLE 2b
## Test of Equality of Variance and Covariance: FA/ TA

| Box's Test | Box's M | df1 | df2 | F | Sig. |
|---|---|---|---|---|---|
| | 24,50 | 10 | 812 | 1,98 | 0,03 |

| Levene's Test of Equality of Error Variances | df1 | df2 | F | Sig. |
|---|---|---|---|---|
| FA/TA: 97 | 1 | 12096 | 6,44 | 0,01 |
| FA/TA: 96 | 1 | 12096 | 5,13 | 0,02 |
| FA/TA: 95 | 1 | 12096 | 4,65 | 0,03 |
| FA/TA: 94 | 1 | 12096 | 6,17 | 0,01 |

Grouping variable: INV versus all other manufacturing firms

## TABLE 3a
## Repeated Measures Analysis: ROA

**Within-Subjects Effects**

| Source | | Sum of Squares | df | MS | F | Sig. |
|---|---|---|---|---|---|---|
| Year Effect | a | 921,68 | 3 | 307,23 | 3,52 | 0,01 |
| | b | 921,68 | 3 | 322,50 | 3,52 | 0,02 |
| | c | 921,68 | 3 | 322,39 | 3,52 | 0,02 |
| Year Effect * Grouping Variable | a | 687,81 | 3 | 229,27 | 2,63 | 0,05 |
| | b | 687,81 | 3 | 240,67 | 2,63 | 0,05 |
| | c | 687,81 | 3 | 240,59 | 2,63 | 0,05 |
| Error(Year Effect) | a | 3274482,71 | 37557 | 87,19 | | |
| | b | 3274482,71 | 35778 | 91,52 | | |
| | c | 3274482,71 | 35790 | 91,49 | | |

Probability that sphericity assumption is NOT violated: p= 0,00 (Mauchly).

a: Sphericity Assumed, b: Greenhouse-Geisser, c: Huynh-Feldt.

**Between-Subjects Effects**

| Source | Sum of Squares | df | MS | F | Sig. |
|---|---|---|---|---|---|
| Intercept | 92198,93 | 1 | 92198,93 | 261,91 | 0,00 |
| Groupin Variable | 55,95 | 1 | 55,95 | 0,16 | 0,69 |
| Error | 4406929,60 | 12519 | 352,02 | | |

**Multivariate Tests**

Year Effect: Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root: p= 0,01.

Year Effect * Grouping Variable: Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root: p= 0,03.

Grouping variable: INV versus all other manufacturing firms

## TABLE 3b
## Test of Equality of Variance and Covariance: ROA

| Box's Test | Box's M | df1 | df2 | F | Sig. |
|---|---|---|---|---|---|
| | 10,46 | 10 | 107441,34 | 1,03 | 0,41 |

| Levene's Test of Equality of Error Variances | df1 | df2 | F | Sig. |
|---|---|---|---|---|
| ROA: 97 | 1 | 12519 | 0,40 | 0,53 |
| ROA: 96 | 1 | 12519 | 0,65 | 0,42 |
| ROA: 95 | 1 | 12519 | 1,38 | 0,24 |
| ROA: 94 | 1 | 12519 | 0,20 | 0,65 |

Grouping variable: INV versus all other manufacturing firms

**TABLE 4**

| Grouping variable | | INVs | Not INV |
|---|---|---|---|
| N | | 18 | 627 |
| Estimated learning parameter | **c** | 5,24 | 2,41 |
| Estimated learning parameter | **a** | 0,88 | 0,95 |
| Model-fit: R-Square | | 0,90 | 0,89 |