

Koster, Sierdjan

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Spin-off firms and individual start-ups. Are they really different?

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Spin-off firms and individual start-ups. Are they really different?

Paper prepared for the 44th ERSa conference, 25 – 29 August 2004, Porto

Sierdjan Koster
University of Groningen
Department of Spatial Sciences
Urban and Regional Studies Institute
P.O. Box 800
9700 AV Groningen
The Netherlands
Tel: + 31 (0)50 363 3885
Email: S.Koster@frw.rug.nl



Abstract

In the field of firm demography, spin-offs have recently attracted attention as a very successful form of new firm formation. Policy makers see spin-offs as particularly fertile innovators in an economy. Theoretically, following lines of thought from the resource-based theory, spin-offs are also expected to perform better than other start-ups that lack the resource base spin-offs inherited from their mother companies. This paper shows, based on an empirical study of American entrepreneurs (ERC-dataset) that spin-offs are indeed a step ahead of firms that do not receive support from a third party company. In the early stages of their existence, spin-offs are leading other new firms in the development of their products, spin-offs show an increased tendency to hire personnel, and spin-offs receive their first income sooner than other firms. At start-up, spin-outs hardly differ from individual start-ups, which have not received any back-up during the gestation process. After one year they seem to perform slightly better.

1. INTRODUCTION

Both spin-offs and start-ups have received ample attention in the literature on new firm formation. Start-ups in general have been investigated in depth from the 1980s on (see Storey, 1982; Wever, 1984). The idea of Schumpeter that new firms are good for economies and innovation was picked up and a need emerged to get more insight in the processes influencing new firm formation. The new firm formation processes of individual firms appear to be very heterogeneous and this is reflected in the characteristics of the new firms. Once this was recognised, several divisions of new firm formation have been proposed. Westhead (1998), for example, made a distinction between novice entrepreneurs and more experienced entrepreneurs (habitual / serial entrepreneurs). He showed that, in general, new firms of experienced entrepreneurs performed better. Focussing on the gestation process in a similar vein, several studies have identified spin-offs as a specific group of new firm formation (Bernardt et al., 2002; Moncada-Paternò-Castello et al., 2000; Agarwal et al., 2003; Garnsey, 1998). Spin-offs are not necessarily new firms of experienced businessmen, but the entrepreneurs do take resources from existing companies which they deploy in their own company. Spin-offs have drawn attention as a very successful group of new firms and have been studied accordingly. However, mainly due to a lack of suitable data, they have hardly been compared to other forms of new firm formation, such as individual start-ups. This paper tries to close this gap and addresses the differences between the two groups, focussing on the gestation processes of the firms and their performance during start-up and one year later. The empirical basis of the comparison lies in the vast ERC dataset¹ from the U.S.A.. This dataset allows a distinction between start-ups and spin-offs and this makes it possible to compare both groups in a systematic way for a large number of cases.

The paper addresses the theoretical background to the problem in section 2. The dataset and the techniques used are described in detail in section 3 and the results are presented in section 4. Section 5 concludes.

¹ Entrepreneurial Research Consortium, see also section 3.1

2. THEORY²

In this paper, the firm is viewed upon from a resource-based point of view, because *'The value of any economic organisation (firm, business, company) derives from and reflects the value ... of the resources under its control...'* (Lewin & Phelan, 2000). Looking at the firm in this particular way is insightful in the present context for two reasons. Firstly, the resource-base theory allows for the idea that new firms can partly be regarded as re-arrangements of existing resources or assets. Spin-offs can be seen as new entities managing existing resources originating from a mother company, whereas the resources of individual start-ups originate from elsewhere. Secondly, the resource-based theory of the firm accommodates a causal relation between the quantity and quality of the resources available and the performance of a company.

2.1 Resources and gestation of the firm

Firms have both tangible and intangible resources. Physical assets such as capital, buildings, and codified knowledge are tangible. Examples of intangible assets are organisational routines, human resources, and tacit knowledge. Especially intangible assets are hard to control and it is inevitable that firms spill-over part of these assets, either to the business environment or to their employees. In a sense, companies educate their employees. Employees accumulate knowledge about the production process, the sector, and the network of providers and customers of a company. Tacit knowledge about the operation of the market and the company, which has been acquired by the employee, can be used as input for a new firm. This knowledge is sector-specific and is hardly useful outside the boundaries of a sector. Extensive knowledge of production processes and networks in the software sector is irrelevant when setting up a new firm in the automobile sector. When an employee utilises sector-specific knowledge in a new founding, resources of the mother company are unintentionally shared with the newly developed firm. An extreme case is the commercial exploitation outside the company of an innovation done by an employee (Anton & Yao, 1995). It is therefore not surprising that firms go through great lengths to avoid these knowledge leakages. In some knowledge intensive industries it is not uncommon for employees to sign a contract in which they state that knowledge will not be used outside of the firm. The effect of resource sharing on new firm formation has been documented in some studies. Bais (1999), for example, finds that most Dutch entrepreneurs

² See also (Koster & Wissen, 2003)

have working experience in the same sector, which suggests that sector-specific knowledge is used in setting up these new firms.

Especially in smaller firms, an additional resource-sharing effect, which is related to general management skills, can be noticed. This type of resource sharing can be typified as “general learning” (Becker, 1964). Employees of small firms normally execute less specialised tasks than their large-firm colleagues, who are mainly concerned with one specialised task. As a result, employees in small firms are not only educated in a sector-specific way, but they also gain insight into the managerial issues involved in running a business. These employees are, in a way, trained to run their own business, irrespective of the sector of the new company. The knowledge acquired can be deployed in every business setting. If employees of small companies indeed experience learning effects of both kinds, this should result in a higher propensity to entrepreneurship, compared to individuals with working experience in larger firms. Several studies support this hypothesis by finding that employees of small firms have relatively good chances of starting a new firm (see for example Garofoli, 1994). General knowledge of entrepreneurship can be deployed in every new firm and is of great benefit to potential entrepreneurs. However, because of its general applicability, it is ruled out as a distinguishing factor for spin-offs. Spin-offs are by definition based on sector specific knowledge (Koster & Wissen, 2003 forthcoming; Bernardt et al., 2002; Klepper, 2001a).

Resources are not only shared unintentionally. In some cases the mother company deliberately helps creating a new firm as part of the business strategy. New firms can offer several benefits to the existing firm. Firstly, a new firm can serve as a breeding ground for new ideas and innovations that are hard to establish within the existing firm. Especially large firms are inclined to support low-risk, capital-intensive innovations because of their extensive bureaucratic backbone (Bhidé, 2000). This inclination could hamper innovative progress. New, small, and above all innovative firms can fill this gap, as has been theorised by Teece (1998). Secondly, a new firm can evolve into a solid business partner that provides services to the mother company based on the specific knowledge of this company. New firms partly based on resources of the mother company are better equipped to identify the wishes and needs of the mother company and act accordingly. A fine supplier or customer can be gained.

Figure 2.1 identifies four possible forms of new firm formation, using the dimensions ‘resource sharing’ and ‘parental support’, as introduced in the above. Individual start-ups are based on resources that mainly originate from the entrepreneur, the individual. Spin-outs do use resources built up in other firms, but the gestation of these firms is not directly supported by the mother company. Like spin-outs, Spin-offs and corporate spin-offs are built on existing resources, and on top of that, during the gestation phase they are supported by a mother company. Support is a continuous term, as there are many levels of support. Organisational spin-offs are totally set-up by the mother company and are usually the result of a reorganisation.

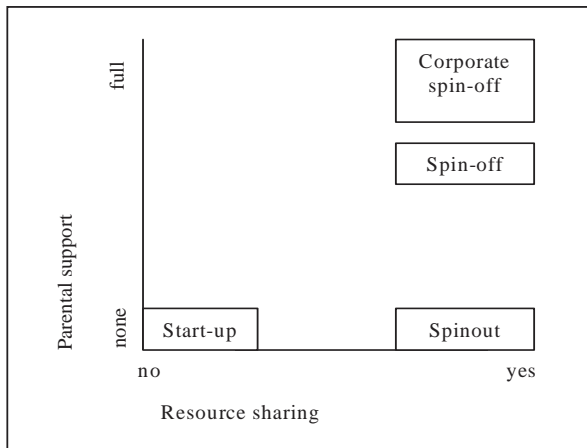


Figure 2.1: firm-founding types

2.2 Resources and performance

The seminal writing on resource-based views of the firm is by Penrose (1959). In this book, she links the availability of resources directly to growth of firms. She shows that “*the resources with which a particular firm is accustomed to working will shape the productive services the management is capable of rendering (p. 5)*”. The statement shows that although resources are important, management is also pivotal for a successful firm. The performance of a firm not only depends on the availability of resources, but also on the way management is able to mobilise and combine its resources for the production process (Agarwal et al., 2003). Kogut and Zander (1992) argue that innovation and progress result from both the acquisition of assets and the new combination of available assets. A good example of the impact of management on the availability of resources is described by Appold (2001). He shows that the management of available knowledge and skills directly

influences the motivation and satisfaction of employees. Continuous mismanagement can lead to a situation in which employees do not function well and they could eventually even leave the firm. This will compromise the availability and quality of the resources used for production. Therefore, both the availability of resources and the management are important factors to explain success of a company.

Based on the availability of resources at start-up, it can be expected, that both spin-outs and spin-offs outperform individual start-ups. Both new founding types have superior access to existing resources due to their, either direct or indirect, connection with other firms in the field (Garnsey, 1998). By definition, spin-out entrepreneurs have set up a firm with specific knowledge of a product and spin-offs even have a third party beneficiary, guaranteeing a solid basis to build the firm upon.

As for management skills, spin-out and spin-off entrepreneurs as such are not expected to be superior over other entrepreneurs. Management skills are personal characteristics and each entrepreneur develops these skills over years. However, as mentioned before, entrepreneurs who worked for small firms are likely to have better management skills. Their tasks are likely to have been diverse and this has given them an understanding of the whole firm, rather than a specialised part of it. In the sample of this study, previously unemployed entrepreneurs are labelled 'individual start-up', which on average could give a small advantage in terms of management skills for spin-outs and spin-off entrepreneurs who were all employed beforehand.

However, it is likely that the availability of resources is more important for the new firms in the data set than management skills. The firms are so young that they mainly consist of the assets they were started with. Entrepreneurs with above-average management capabilities have not yet had the time to improve the resource base of the firms and consequently their performance. Differences in the level of management skills would therefore not show in the results yet. In this study, the management skills are assumed equal and are not part of the analysis. Studies following cohorts of young firms, bearing in mind the different resource bases they have, should explicitly address the management capabilities of the entrepreneurs in the explanation of growth patterns.

3. DATA

Most studies on spin-offs take the form of case studies of a firm or a region, typically an economic cluster. In these case studies the linkages between companies and its offspring are monitored and conclusions are drawn on the gestation of an economic cluster (see for example Klepper, 2001b; Dahl et al., 2003). The absence of suitable datasets causes the lack of comparative studies on a higher regional scale. This study is based on the large ERC dataset, which is suitable for the purpose of comparing spin-offs to other start-up groups.

3.1 ERC³

The ERC dataset is the result of a large study of individuals in the United States with the goal to unravel their entrepreneurial activities in detail. The goal of the endeavour is hardly unique, as there have been many studies about the motives, actions and goals of entrepreneurs. However, the combined efforts of the participating universities and research institutes resulted in a large and longitudinal dataset, which is unprecedented. The dataset contains comprehensive information on nascent entrepreneurs, their backgrounds, goals, expectations, and resources. The dataset includes precise information about the gestation process of new firms and the role of other actors in this process. This makes it possible to identify spin-offs, spin-outs, and individual start-ups. Unfortunately, the dataset lacks cases of corporate spin-offs. These start-ups are assumed to be totally instigated by already existing firms and therefore this group has been filtered out from the research population. Consequently, the conclusions in this paper apply only to entrepreneurial spin-offs. The focus on individuals should be borne in mind when interpreting the results. The results apply to individuals that are in the process of setting up a new business. Not the firm itself is the unit of study but the entrepreneur working on it. However, especially in the early stages of development of a firm, owner and firm are very closely related (Stam, 2003). Besides, many variables in the questionnaire, directly relate to the firm and not the entrepreneur. Especially performance and development indicators, which are used in the present study, relate to the firm rather than to the entrepreneur.

The new firm formation groups (Figure 2.1) are defined on the basis of the dimensions ‘resource sharing’ and ‘outside help’. Several questions in the survey relate to these dimensions and were used to identify the founding groups. Spin-outs entrepreneurs, for

³ This dataset is freely accessible through the internet: <http://projects.isr.umich.edu/psed/>

example, indicated that during the gestation process no outside influence was experienced, but that the firm is a result of specific knowledge the entrepreneur acquired earlier in a job. In a similar vein, individual start-ups and spin-offs could be distinguished, as is explained in detail in Appendix 1. Unfortunately, part of the cases could not be categorised because of missing values. This group consists of individual entrepreneurs with previous experience in jobs. It is unclear, though, whether their firms are based on specific knowledge of a product, which would make them spin-out entrepreneurs. It is therefore not possible to make the distinction between individual start-ups and spin-outs for this group. This mixed group of entrepreneurs is designated as SU/SO (Start-up / Spin-out).

The ERC-study has been organised in four steps, or waves. The first step deals with the determination of the research population, which consists of nascent entrepreneurs and a control group. In this phase entrepreneurs involved in corporate spin-offs, for example, were identified and filtered out. About 64500 U.S. citizens were randomly selected and their entrepreneurial behaviour surveyed. A group of 1250 individuals was selected, of whom 850 were nascent entrepreneurs. The remaining 400 serve as control group. The identified population has been studied in three questionnaire-waves. The first wave was carried out in 1998-1999, the follow-ups one and two years later. This method secures a longitudinal knowledge of the entrepreneurial actions of the population. Table 3.1 summarises the sizes of the four waves.

Wave	Population (N)
Screenener - survey	64622
Wave I	1261
Wave II	1261
Wave III	1261

Table 3.1: data-set description (based on the codebook)

As most longitudinal studies, this particular study experienced quite a substantial amount of attrition in the dataset. A significant number of respondents have no records in the second and third wave of the study. Especially individuals with a failing entrepreneurial endeavour are expected to drop from the participants list, as the respondents are more likely to talk about success than about the failure of their firm. The survey therefore probably shows a bias in the latter waves towards successful start-up attempts. Table 3.2 gives an idea of the loss with the passing of time. Exact figures are not available, as they are not included in the database. Variables from the third wave are not included in the dataset all

together. The codebook gives some insight in the development of the number of participants. Note that the number of system-missing cases differs slightly from variable to variable in the last two questionnaire-waves. This paper uses data from the first two waves. Detailed information on the project can be found in the guide to the dataset (Reynolds, 2000).

	Respondents	Control group	Attrition	Total
Wave I	830	333	98	1261
Wave II	± 300	333	± 625	1261
Wave III	± 300	333	± 625	1261

Table 3.2: Panel attrition (derived from codebook)

4. RESULTS⁴

In the remainder of the paper, firms from the four founding groups are compared. On the one hand, the abilities to successfully end the start-up phase are assessed. On the other hand, the performance of the firms are also regarded. Spin-offs are expected to score better on each of these dimensions because of their superior resources and knowledge of the relevant networks. The set-up of the dataset allows the monitoring of new firms in the first year of their existence. The first wave identifies the characteristics of the new firm when they are on the verge of entering business. The entrepreneurs might have taken care of many things already, but the firm has not been developed totally (Reynolds, 2000). In the second wave, the situation one year later is examined. Before turning to the start-up success and performance of the firms, I present the sizes of the four founding groups.

4.1 Group sizes

Table 4.1 shows the break-down of the entrepreneurs into the four start-up groups, individual start-ups, spin-outs, spin-offs and the awkward mixed group. The table shows the shares of the groups for both the first and the second wave of the questionnaire. It is clear that spin-offs (corporate spin-offs excluded) form the smallest group. Every eighth entrepreneur felt that the gestation process of the new business was influenced by another firm. The rest of all new start-ups can be considered the endeavour of an individual or a group of individuals. It is important to notice, however, that just over 20% of all new firms

⁴ All figures presented have been based on weighted variables. The ERC dataset shows, as a result of the design of the study, an overrepresentation of female entrepreneurs and entrepreneurs of ethnic minorities. All outcomes have been corrected for this (cf. Reynolds, 2002)

are based on specific knowledge of the entrepreneur (spin-outs). These new firms are in an indirect way also related to existing firms. The specific knowledge and experience, on which firms are based, were collected in existing firms. For spin-outs, existing firms are one of the sources of the assets the entrepreneur uses to start the new firm. About 35% of all new firms seem to be related to existing firms and this justifies the recent increase of studies concerning spin-offs. In the second wave, the combined groups of spin-offs and spin-outs have an even larger impact. After one year 43% of the interviewed firms are firm-influenced foundations. The higher share seems to be partially caused by a great drop in the share of the mixed group. Although it is hard to give a solid explanation for this phenomenon, it may be a relic of the questionnaire. Poorly filled out questionnaires, which leads to a placement in the mixed group, could be a sign of indifference towards the ERC-study. Members of this groups are therefore more likely to disappear in the following waves. It could also be a sign of indifference towards the new founding. Several indicators of performance do indeed show the marginality of the firms which have been placed in this mixed group.

	N (Wave 1)	%	N (wave 2)	%
Individual start-up	328	39.5	217	42.7
Spin-out	182	21.9	144	28.3
Individual start-up / Spin-out	208	25.1	72	14.2
Spin-off	112	13.5	75	14.8
Total	830	100	508	100

Table 4.1: sizes of the start-up groups

Although the literature about spin-offs is growing steadily, it is still hard to find studies that have measured the number of spin-offs in a region in relation to other founding types. However, the few studies that exist are quite consistent regarding the share of 35% (spin-out and spin-offs), found in this study. For the province of Groningen in The Netherlands, the population of entrants in the year 2002 was sampled and 33% of all new firms in this year qualified as a spin-off (Helfrich et al., 2003). Studies by EIM (Bernardt et al., 2002) and Eurostat (Moncada-Paternò-Castello et al., 2000) worked with stricter definitions of spin-offs and, respectively, estimated 15 – 18 %⁵, and 10 – 15 %⁶ of all new firms to qualify as a spin-off. Applying the strict definition to the Groningen-study leads to a spin-

⁵ For the year 2001

⁶ This figure is an average of several years

off share of 9%, which is a bit less than the share found in the EIM-study for the whole of The Netherlands. These figures compare quite well to the share of 13.5%⁷ reported in Table 4.1. Although these studies used different approaches and were even conducted in different countries, the outcomes match up quite nicely. The share of firm influence start-ups appears to be rather stable.

It can be concluded that the existing stock of companies does indeed influence the development of new companies. However, the largest share of new firm formation activity can be typified as individual start-ups.

4.2 Gestation process

On average, spin-offs can take a longer time before coming into being. The entrepreneurs typically have a job during the set-up period, which makes the start of an own firm less pressing than for someone who is unemployed, for example. The low-pressure gestation period, in combination with the extra resources of the spin-off, enables the entrepreneur to construct a solid basis for the new firm. This should lead to a head start of spin-offs compared to other founding groups. Table 4.2 shows indicators of the stages of development the new firms are in. The significance ratings are the result of chi-square and ANOVA tests on the complete set of data entries, which are available from the author upon request. The percentages in the table represent the proportions of firms in the specific groups that have answered ‘YES’ to the statements in the left hand column.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Product completed	47 %	28 %	42 %	64 %	***
Only product idea	14 %	26 %	15 %	4 %	***
Started promotion	58 %	44 %	59 %	75 %	***
Purchased materials	74 %	64 %	74 %	69 %	*
Purchased facilities	52 %	51 %	55 %	51 %	

Table 4.2: Scores on indicators of preparation during start-up
 Percentages are the shares of positive answers per category
 *** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

Looking at the products of the new firms, spin-offs, indeed, seem to be a step ahead of the other groups. About two thirds of all spin-off firms have already developed their final products and are in fact ready to sell to costumers. The other groups lag behind quite

⁷ This number relates to entrepreneurs and not necessarily to firms, like the numbers from the other studies. It can be assumed however that every interviewed entrepreneur is working on only one firm, and that all interviewees are working on separate firms.

considerably. Spin-outs and individual start-ups have fairly similar scores, and the mixed group is the downward outlier. Firms that have only started thinking about the product are shown in the second row and form the other end of the spectrum of product development. The results are consistent, few spin-offs are in the 'invention'-stage compared to the other groups. The χ^2 -test performed gives a significant result, which means that the subsets are not drawn from the same population. The groups are significantly different and spin-offs are in a later stage of product development than other firms. This is also reflected in the promotional efforts of the groups. Spin-offs deploy more promotional efforts than the other groups. Spin-off have a product to sell and therefore need promotional activities. These results are in line with findings of Heirman et al. (2003), who studied new technology firms in Belgium. They found that entrepreneurs with extensive experience in a specific sector who are backed-up by venture capitalists or corporations are likely to start a firm based on a product idea. Although spin-offs are not defined as such in the paper, the characteristics of the product-oriented firms (product start-ups) match those of spin-off quite nicely. Knight (1988), on the other hand, finds that only 8% of all spin-off entrepreneurs based their companies on a specific idea for a new product. He also showed, however, that 52% based the company on knowledge and experience with the same products the mother company produced. New product ideas are probably not the first incentive to start a spin-off firm, but knowledge of existing products is.

The last rows in Table 4.2 address the acquisition of materials and facilities that are needed for the new business. This includes everything from office supplies to the raw material needed to produce a product or a prototype. These items can all be regarded as essentials or preconditions for the operation of a firm. The differences between the groups are minimal. These items are evenly important to all groups and all new firms seem to be evenly capable of attracting supplies to start the business running.

One year later, the situation has not changed much (Table 4.3). Spin-offs are still leading in terms of product development and promotion. They seem to be capable of retaining the head-start throughout the first year of operation. The spin-off group also shows the highest share of firms that have completed the gestation period and have turned into a full-fledged company. The low scores of the mixed group on the start-up process indicator hints towards the idea that this group indeed consists of relatively marginal firm of entrepreneurs who do not feel obliged to participate in the questionnaire. Strangely

enough, only 1 out of 4 remaining spin-offs claims to have purchased facilities, while this percentage was much higher at first. A good explanation does not seem available.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Start-up process completed	35 %	17 %	31 %	43 %	**
Product completed	67 %	28 %	57 %	89 %	***
Started promotion	54 %	54 %	50 %	83 %	
Purchased materials	57 %	69 %	53 %	81 %	
Purchased facilities	64 %	46 %	50 %	25 %	**

Table 4.3: Scores on indicators of preparation 1 year after start-up

Percentages are the shares of positive answers per category

*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

In general, spin-offs seem to be relatively quick in producing and marketing the product of the new firm. Besides they are able to retain their lead in development and one year later spin-offs are still in a further phase of development than the other firms. The purchase of supplies and raw materials seems to be equally difficult (or easy) for all firms.

4.3 Performance

Spin-offs show a lead in evolution when it comes to product development. These firms are closer to marketing their product and as a result, closer to receiving income. The head start can therefore be reflected in the performance of the firms. Performance is very difficult to measure and a host of suitable indicators have been suggested. In this study, three indicators are used: survival, employment, and income (see also Schutjens & Wever, 2000). These three dimensions are probably the indicators most commonly used to measure success.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Expectation upon start-up:					
Odds 'still alive in 5 year'	80 %	85 %	80 %	85 %	**
Situation after 1 year:					
Operating business	35 %	17 %	31 %	43 %	
Active start-up	29 %	38 %	33 %	18 %	**
Inactive start-up	16 %	19 %	19 %	19 %	
Dead / other	20 %	26 %	17 %	20 %	

Table 4.4: Survival

*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

Table 4.4 shows both the life-expectancy of firms in the gestation phase and the situation after one year. It becomes clear that entrepreneurs are fairly positive when starting a new firm. Over 80% of all entrepreneurs expects to be still in operation after five years. The differences between the groups are rather small and there is an overall positive feeling.

It is well-known from previous research that survival rates are usually much lower. It is therefore not surprising that not all entrepreneurs can live up to their expectations. The last two rows indicate that, after one year, between 35% and 45% of all start-up efforts are no longer worked on. Again the groups show not much diversity. The share of abandoned start-up efforts is rather stable. As shown in Table 4.3, the success rate however differs quite considerably.

Tables 4.5 and 4.6 shed some light on the second dimension of performance. They show the employment generated by the new firms at start-up and after one year. From the first two lines of Table 4.5 it becomes clear, once again, that spin-offs are ahead of the other new firm formation groups in terms of development. Out of all spin-offs, 24% have already hired employees. New firms without any specific back-up from an existing firm are less able to hire employees in the first stages of existence. Ambition does not account for these differences, because in the second row it is shown that start-ups and spin-outs are expecting to hire employees in the future. These entrepreneurs are just as willing to hire new employees, but they simply have not come around to it yet.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Hired employees (% of group)	15 %	13 %	11 %	24 %	**
Will hire employees (% of group)	48 %	54 %	56 %	32 %	***
Full-time jobs now	1.83	1.52	1.89	3.27	
Part-time jobs now	1.81	1.77	1.84	1.40	
F-T jobs 1 year	3.61	5.36	4.07	5.28	
P-T jobs 1 year	2.38	2.61	2.42	3.16	
F-T jobs 5 years	10.01	15.03	20.27	18.50	
P-T jobs 5 years	6.31	9.81	6.40	9.28	

Table 4.5: Employment during start-up

Percentages are the shares of positive answers per category

*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

The bottom part of Table 4.5 shows the number of employees the firms have hired, or expect to hire in 1 year and 5 years respectively. The table shows the average of employees hired for those firms that indeed have hired any. Firms without any employees are not included in the figures. The ANOVA-tests performed (Appendix 3) show no significant differences between the groups. Although not statistically significant, spin-offs do show a tendency to hire full-time employees instead of part-timers. Results from the 'Groningen-study', mentioned earlier, point to the same direction. Helfrich et al. (2003) show that although the number of employees is equal for all groups, spin-offs appear to be more

prepared to commit themselves by hiring more full-time employees. Individual start-ups, generally, favour part-time employees. The difference for employment in the earlier stages is not so much expressed in numbers, but rather in commitment.

After one year the situation has changed and there is no longer a significant difference between the groups regarding the question whether they have hired staff or not. The numbers of employees however do differ at this point. Spin-offs show a higher number of employees than other firms. It is also interesting to see that spin-outs also have slightly higher employment figures than individual start-ups. At start-up the firms of these two groups have the same characteristics, but after one year of operation spin-outs seem to perform slightly better than individual start-ups. The expectations of the groups are not reported as they are comparable to the expectations at start-up.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Hired employees (% of group)	20 %	29 %	17 %	24 %	
Will hire employees (% of group)	38 %	46 %	41 %	32 %	
F-T jobs now	1.84	0.33	2.26	6.71	**
P-T jobs now	1.64	1.42	3.38	4.67	*

Table 4.6: Employment 1 year after start-up

Percentages are the shares of positive answers per category

*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

Table 4.7 shows the scores per group for other indicators of success, income being the most obvious of these. Once again, spin-offs outperform the other start-up groups; 54% of all new spin-off companies have already received income. Start-ups and spin-out lag behind, and the mixed group is again the downward outlier. The levels of expected income after the first and fifth year, however, are not significantly different. This shows that the motivation and goals are equal. Receiving income seems to be linked directly to the stage of product development the new firms are in. Firms need a complete product before receiving any income. As is shown in Tables 4.2 and 4.3, spin-offs are leading the other founding groups in terms of product development, which can account for their superior income levels. In contrast, many firms in the SU/SO-group are still working on the development of their final product. Consequently, many of these firms have not received any income yet. The same line of reasoning applies for start-ups and spin-outs, which form the middle-groups for both indicators. Although logical in terms of internal coherence of the study, these results do not make sense theoretically. There is no obvious reason why the SU/SO-group should differ from start-ups and spin-outs. Assuming that start-ups and spin-outs are distributed proportionately over the SU/SO-group, the scores of this group should

be in between, or at least close to, start-ups and spin-outs. However, this group seems to perform worse on most of the indicators. A lack of interest in both the ERC-questionnaire and the firm could account for the low scores.

Receiving income does not guarantee a positive monthly balance. The χ^2 -test indicates no significant differences between the groups, and, at first glance, the figures even suggest less profit for spin-offs. Apparently spin-offs have to cope with higher costs, which counterbalance the income received. The extra marketing activities of spin-offs, reported in Table 4.2, support this idea.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Received income (% yes)	44 %	27 %	42 %	54 %	***
Expected income 1st year (\$1000)	506	297	452	1002	
Expected income 5th year (\$1000)	1843	2635	1775	2309	
Company is making monthly profit	33 %	36 %	40 %	24 %	
% Sales to largest 3 customers	35 %	40 %	29 %	38 %	*

Table 4.7: Indicators of success during start-up

Percentages are the shares of positive answers per category

*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

In the long run, being dependent on a small number of customers negatively influences the survival chance of a company (LaBahn, 1998; Kalwani & Narayandas, 1995). Although this indicator is not directly related to the present success of a firm, it does show its vulnerability and chances of success in the future. Especially in this study the percentage of sales to the three largest customers is interesting, while spin-offs, and to a lesser extent spin-outs, have established connections with existing firms. These types of new firm formation may be prone to a 'monorelationship', because the links between the new firm and the mother company are already in place and relatively easy to maintain. This idea is not supported by the results in Table 4.7. The scores are close to each other; about 35 % to 40 % of all sales are to the largest customers. Spin-outs have a somewhat lower percentage, which could indicate the ability of these entrepreneurs to combine the benefits of good knowledge of the relevant networks (i.e. customers) and individual entrepreneurship. Spin-off entrepreneurs also have the knowledge of network, but it may be harder for them to break the links with the mother company.

	Start-up	SU/SO	Spin-out	Spin-off	Significance
Received income (% yes)	53 %	39 %	68 %	81 %	**
Company is making monthly profit	55 %	28 %	55 %	59 %	
Income 1 st year (\$1000)	132	83	393	167	**
% Sales to largest 3 customers	48 %	59 %	38 %	30 %	**

Table 4.8: Indicators of success 1 year after start-up
Percentages are the shares of positive answers per category
*** - $\alpha < 0.01$, ** - $\alpha < 0.05$, * - $\alpha < 0.1$

After one year, again the situation has not changed much. Spin-offs are still leading the other start-ups. Both income and dependency level are better compared to the other groups. Again the rise of the spin-out group is noticeable as they outperform individual start-ups regarding both income and dependency. Spin-outs even show the highest average income. However, the average is biased because of several high outliers (even after correction for the most severe cases).

5. CONCLUSION

This paper compared spin-offs to spin-outs and individual start-ups. Based on theoretical ideas, stemming from the resource-based view of the firm, spin-offs are assumed to outperform individual start-ups based on their superior capabilities to mobilise resources and find their way in the relevant business networks. This notion has been confirmed in several studies, using rather small samples of spin-offs and other companies (Bernardt et al., 2002; Shrader & Simon, 1997; Dahl et al., 2003). This paper, using the large ERC dataset, also supports the general idea that firm-supported start-ups (spin-offs) will outperform other founding types, both at the point of start-up and one year later. Spin-offs score best on product development, employment figures, and income. Theoretically also spin-outs are expected to perform better than individual start-ups as they have specific knowledge about the product and the market the new firm will be operating in. However, when at the verge of starting the firm, spin-outs do not distinguish themselves from other entrepreneurs. Spin-outs perform just as good (or bad) as individual start-ups. Only after one year do spin-outs slightly come to the forefront.

The key to a successful start-up seems to be in the close ties between a mother company and its offspring. The lack of support during start-up (that spin-offs do receive) hold back individual start-ups and spin-outs. Spin-outs later on compensate this with the specific knowledge they possess. This line of reasoning is in corresponds with the resource-based theory which predicts firms with good access to relevant resources to outperform other firms. This study, however, does not provide a formal test of the question whether the

fact that a firm is a spin-off really boosts the performance of this firm. Further research is necessary in order to test the ideas expressed in this paper.

Although successful, spin-offs, can not be seen as a panacea for economic development problems. Despite the fact that this paper shows that spin-offs are a step ahead of their opponents in the first phases of their development, the effects in the long-run remain unclear. It all depends on the ability of the other firms to catch up with the superior utilised spin-offs. Besides, it is still important to realise that the individual start-up is still the predominant form of entry and this will probably not change. Firms can only support new firms to a certain extent, and individual action will remain the most important drive behind new firm formation.

6. BIBLIOGRAPHY

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7. APPENDIX 1

Firms have been allocated to one of the distinguished start-up groups on the basis of the following criteria:

Individual start-up:

$$Autonsu = \text{NO OUTSIDE INFLUENCE} \wedge Q331 = \text{NO}$$

The entrepreneur started a new firm without any outside influence and was not employed before starting the new firm.

$$Autonsu = \text{NO OUTSIDE INFLUENCE} \wedge Q331 = \text{YES} \wedge Qa5b = \text{NO} \wedge Qa5h = \text{NO}$$

The entrepreneur started a new firm without any outside influence and was employed before starting the new firm. The new firm however was not based on experiences or knowledge of specific technologies from previous employment.

Start-up / Spin-out:

$$Autonsu = \text{NO OUTSIDE INFLUENCE} \wedge Q331 = \text{YES} \wedge Qa5b = \text{N/A} \wedge Qa5h = \text{N/A}$$

The entrepreneur started a new firm without any outside influence and was employed before starting the new firm. There is no information on experiences or knowledge of specific technologies (i.e. these employees could be involved in either a spin-out or an individual start-up)

Spin-out:

$$Autonsu = \text{NO OUTSIDE INFLUENCE} \wedge Q331 = \text{YES} \wedge (Qa5b = \text{YES} \vee Qa5h = \text{YES})$$

The entrepreneur started a new firm without any outside influence and was employed before starting the new firm. The new firm is based on experiences or knowledge of specific technologies from previous employment.

Spin-off:

$$Autonsu \neq \text{NO OUTSIDE INFLUENCE}$$

The entrepreneur started a new firm with outside influence.