DO BIRDS OF A FEATHER FLOCK TOGETHER? THE FINANCING OF UK SOFTWARE AND BIOTECHNOLOGY FIRMS AT THE EARLIER STAGES OF BUSINESS DEVELOPMENT

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Do birds of a feather flock together?
The financing of UK software and biotechnology firms at the earlier stages of business development

Abstract

This paper explores the funding issues at the early stages of development of small biotechnology and software firms in the UK. The paper reviews theory and evidence on firms in these two sectors and presents empirical evidence for the UK derived from an extensive on-line questionnaire survey. The sample consists of 41 small biotechnology firms and 42 software firms representing a sub-sample of a larger sample of 133 high technology small firms (HTSFs) or technology-based small firms (TBSFs). As a sub-group of Small and Medium-sized Enterprises (SMEs), HTSFs face a number of obstacles to their business development. Finance is believed to be one of the main problems particularly at the early stages of their development. HTSFs encounter financing problems mainly because of their embryonic nature, young age, lack of collateral, lack of business skills, lack of market presence, high technical area and other factors.

The main findings from this study suggest that entrepreneurs in the biotechnology sector reported higher academic qualifications than the other group. The founders of software firms are younger than the biotechnology firms. Firms in both groups have grown in terms of full-time employees. In terms of funding problems, software firms reports more funding problems than the biotechnology firms. Software firms are fastest growing firms and goes through the early stages of development quickly than the biotechnology group. With regards to the sources of funding the evidence shows that biotechnology small firms mainly use venture capital finance whilst the main source of funding for the software firms is personal savings and bank finance. However, biotechnology small firms report difficulties in securing equity finance. Software firms seem to be constraining their growth by the demand side financial constraints.

The two groups of HTSFs in this study suggest that high technology small firms may have particular needs for finance and that these may change as they develop through early stages of business development. The paper present evidence on these issues and suggest differences in the experience of biotechnology and software firms in terms of financing.

Keywords: SMEs, HTSFs/TBSFs, biotechnology small firms, computer software small firms, research and development, entrepreneurship, innovation and venture capital.

1. Introduction

The attitudes towards small firms and their role in economic development were very different some forty years ago. Then, it was believed that large firms are more important and more capable of competing in the world markets and therefore, mergers and acquisitions were supported. However, since the 1970s, the attitudes started changing as massive changes were also occurring on the global level (such as the oil price shocks). On a more national level in the UK, there were massive unemployment as a result of major decline in the textile industry and other industrial sectors. This was mainly due to the other emerging economies on the world economic map such as China and other Asian economies competing with the UK products in international markets. The UK large industries were unable to compete due to the relative expensiveness of their products and services. However, in this turbulent time, a creative destruction was also taking place. In order to survive and adjust to new economic challenges, there was a need for small businesses everywhere.

Parallel to this general economic restructuring, there were also particular changes occurring in the way the academic institutions were working. Previously, academic institutions were heavily state sponsored and academics were seen as people away from the real business world. Their main role was teaching and research. However, this was also undergoing major changes. Public financial support to academic institutions was heavily cut and the emphasis on generating own income was rising. Academic research must have to be transformed into economic value. This lead to the increasing involvement of academic institutions with industry. In this context in the UK in particular and elsewhere generally, there was a trend to establish property based initiatives such as science parks and incubators. The main aim was to support small firms established as a result of the academic research in universities and other higher education institutions. Briefly, a new economic structure was beginning to emerge and gaining strength with the passage of time.

In this new economic framework, small firms in general and high-technology small firms in particular are increasingly seen as the source of new ideas, innovation, job creation, regional, national and international economic development. Technology-based small firms are seen by many as a US phenomenon but nowadays almost every advanced economy and increasingly the developing countries are obsessed with the establishment of TBSFs and perceive them as a key to economic development.

In this context, the role of TBSFs as engines of economic growth is well recognised and has attracted much public and private attention not only in the UK but internationally as well and there is a growing academic and policy-related literature on the subject. It is believed that the invention and innovation provided by TBSFs, particularly in sectors such as computer software and hardware, biotechnology, pharmaceuticals, life sciences, communications and other aspects of high-technology is vital for economic growth and development. The extraordinary success and performance of Silicon Valley and Route 128 technology-based start-up businesses in the US is seen by many as the sine-qua-non of future economic and business development (Berger and Udell, 1998).

TBSFs go through certain stages of development in their life cycle as depicted in Kazanjian (1988), Clark and Guy (1998), Oakey (2003) and Ndonzuau, Pirnay and Surlemont (2002). Depending on the nature of the technology and potential markets for TBSFs, finance could be a serious problem at early stages of business development. It is argued that due to their special characteristics, TBSFs may find particular environment such as science parks and incubators as ideal places for their growth and early stages of development. This paper focuses on the financial needs and experiences of 42 computer

software firms and 41 biotechnology firms at the early stages of their business development. This paper is attempting to increase our understanding of the differences between software and biotechnology small firms in the UK. We believe that this increased insight will have important policy implications and a guide for financiers. The rest of the paper follows this structure: Section 2 discusses the main literature on the financial issues of TBSFs. Section 3 discuss the methodology and methodological issues. Section 4 provides the empirical evidence gathered on the financing issues of the sampled firms. Section 5 concludes the paper and identifies the future research in this area.

2. Literature review

There is a huge literature available on small firms and particularly on the financing issues of small firms. We can categorise this vast literature into three main categories: firstly there are public reports and enquiries conducted on behalf of the UK government; secondly theoretical models and explanation of the funding gap and thirdly there are empirical studies which mainly confirms the theoretical models. There are many other studies investigating different aspects of the HTSFs business development but to provide a comprehensive overview of all HTSFs literature is beyond the scope of this paper. Therefore, we limit ourselves to the main literature on HTSFs funding issues.

The UK government has always taken an active interest in the finance problems of small firms. The history of public investigation into the funding gap goes back to the times of great depression. Bolton (1971) and Wilson (1979) presented their reports on finance for small firms. The Bolton Committee (1971) reported that there was no institutional deficiency in the financial markets for small firms in the UK and the Wilson Committee (1979) did not find any evidence that suggested a general shortage of finance for small firms in the UK. However, the main focus of these public enquiries was on the SME sector rather than focusing in detail on the particular sub-groups (such as TBSFs) of the SME population. The first public report that addressed the problems of the TBSF sector was that of the Advisory Council on Science and Technology (ACOST) in 1990. This report focused on TBSFs finance and the financial constraints that these firms encounter at critical stages of development. The report concluded that due to the higher risks associated with TBSFs and the difficulties in assessing their technology and high innovative nature, institutional investors (particularly banks) were hesitant to provide financial assistance.

In response to an increasing concern over the finance issues of TBSFs the Bank of England has reported regularly on this subject. Its first report on the financing of technology-based small firms was published in 1996 and this report suggested that TBSFs may face financial constraints at start-up and early stages of development and that these constraints might be due to market imperfections. The report argued that finance providers find it hard to assess the viability of TBSFs business ideas due to their scientific basis or high-technology nature of their products and as a result remain cautious. Quite recently, the Bank of England (2001) report found that finance constraints at early stages of development were a particular problem for those TBSFs which were at distance from technology clusters. The House of Lords Select Committee (1997) and the Confederation of British Industry (CBI) report on Tech-Stars (CBI, 1997) also reflected these views and suggested that since at start-up TBSFs do not generally have viable products, it is extremely difficult to assess the size of potential markets and it is difficult to evaluate the technological risks. This increases the risk for financiers to invest in such products. The Select Committee suggested that TBSFs should be encouraged to use incubators and science-parks to improve mutual understanding and help overcome the associated risk and information asymmetries.

Similarly, the Williams (1998) report suggests that equity finance is more appropriate than debt assuming that TBSFs have no earnings at the early stages, hence difficult to repay loans whilst Modigliani and Miller (1958) suggest that once a project shows some earnings, debt could be retired and replaced with an equity issue at much better prices or through retained earnings. This justifies the important role of the venture capital industry in the UK and in the absence of such a role and a focus on the Management buy-in (MBI) and Management buy-out (MBO) is a cause for concern. Williams report also compare venture capital investments in TBSFs early stages in the UK with the US and show that according to the 1997 statistics, US venture capital industry invested £5800 million while the corresponding figure for UK is only £349 million. Murray and Lott (1995) find that US VCFs invest three times more than their UK counterparts in young new technology-based firms after taking away the MBI and MBO investments. In US, VCFs tend to invest more in the early stages of TBSFs whilst in the UK VCFs has a tendency towards MBO/MBI and other later stages. Moreover, Wright and Robbie (1998) suggest that there are marked differences between the informal investors of UK and other countries such as US and Sweden.

Oakey (2003) notes that the TBSFs funding problem is deep rooted due to free market policies in the 1970s and 1980s. He suggests an integrative support by the public and private sectors for TBSFs finance. He argues that due to short-termism and associated risks, there exist a temporal-gap and a risk-gap for TBSFs. Oakey's hypothesised temporal-gap suggests that the available public support diminishes at a point when TBSFs product is not yet ready for the market and that there is a five-year funding gap in the development of a product. The risk-gap notions suggest that as many as 50% TBSFs are clearly unfundable, 30% are probably unfundable, 10% in the critical area of being probably fundable and as little as 10% receiving funding. Accepting this analysis means that even if the probably fundable all receive funding, only 20% of the TBSFs population are funded. Westhead and Storey (1997) suggest that most technologically sophisticated firms report that their growth has been impeded by a continual financial constraint.

One of the reasons most cited in the literature on why TBSFs have financing problems is information opacity. Leland and Pyle (1977), Sahlman (1990), Myers and Majluf (1984) suggest that financial markets are informationally opaque and that borrowers know more about the potentials and nature of their businesses than do lenders. Similarly Admati and Pfleiderer (1994), Aghion and Bolton (1992), Amit Glosten and Muller (1990), Bergemann and Hedge (1998), Cable and Shane (1997), Chan Seigel and Thakor (1990), Demsetz (1969), Dewatripont and Tirole (1994), Fama and Jensen (1983) and Jensen and Meckling (1976) all address the agency problems where an entrepreneur and financier interact with conflicting interests.

Empirical studies such as Berger and Udell (1998), Trester (1998), Wright and Robbie (1996), Wright and Robbie (1998), Himmelberg and Petersen (1994), Jordan, Lowe and Taylor (1998) and Leland and Pyle (1977) suggest that 'information asymmetry' is the most important characteristic of small business finance which is most acute in the case of TBSFs.

Dewatripont and Tirole (1994) suggest that the involvement of external financiers reduces the riskiness of the new ventures and resolves the problems of moral hazard and adverse selection. On the other hand Jordan, Lowe and Taylor (1998) and Himmelberg and Petersen (1994) suggest that small firms are riskier both for debt and equity investors and the founders' concern about loss of control determine the capital structure.

Dixon (1991), Muzyka, Birley and Leleux (1996), suggests that venture capitalists is looking for an experienced management team while investing in a firm. Projects

without a good management team and reasonable idea but with good financials appear to be meaningless. MacMillan, Siegel and Narasimha (1985) also find that the most frequently used criterion is the quality of the entrepreneur.

Differentiating the supply-side financial constraints from the demand-side financial constraints, Cressy and Oloffson (1997) suggests that a supply-side financial constraint means a capital market imperfection that leads to a socially incorrect supply of funds to projects (e.g. different funds as in the case of rationing) or the incorrect interest rate charged on funds. On the other hand, the demand-side financial constraint is a capital market imperfection in which performance of a firm is adversely affected by a factor internal to the firm. For example if a firm's owner wants to grow the firm, but the only way to grow is to relinquish equity and he/she do not want to do so. In such a situation they suggest the demand for funds is demand constrained.

Finally, Moore and Garnsey (1993) explore the effects of the SMART (Small firms Merit Award for Research and Technology) scheme. They conclude that the successful operation of SMART scheme justifies the government intervention since information asymmetries are reduced with the support of SMART. This appears to create added value to firms as non-winners under the SMART scheme are expected to face further financial problems during the life cycle of innovation. Similarly, Lerner (1999) examines the impact of the Small Business Innovation Research (SBIR) programme in the US and argues that SBIR winners grew significantly faster than non-winners and were more likely to attract venture finance.

This brief literature review suggests that the main arguments for HTSFs financial problems are believed to be information opacity (which leads to moral hazard and adverse selection problems), the unwillingness to give up equity in return for finance, high technicality of the business product/service, inexperience of the founding team, lack of tangible assets etc. This paper explores these funding issues for the UK software and biotechnology firms and is attempting to provide further understanding of these issues and guide policy and practice in tackling the finance problems of HTSFs.

3. Methodology, methodological issues and data collection

This paper discusses the most crucial problem of finance for UK TBSFs in the computer software and biotechnology sectors. The empirical evidence reported here was originally collected for a comparative study of on-park and off-park firms to explore the funding problems of TBSFs at their early stages of development and the contribution of location in overcoming the finance problems. Using electronic survey questionnaire between 20th November 2002 and mid March 2003, we received 133 (22.45%) usable responses which were recorded in SPSS for analyses. The current sub-sample consists of 41 biotechnology and 42 software small firms which represents 62.41% of our total 133 responses.

The sample selection process involved obtaining lists of TBSFs from the United Kingdom Science Parks Association (UKSPA), the United Kingdom Business Incubation (UKBI) websites. The off-park firms were selected from the FAME data source (accessed through the Liverpool University library catalogue) and technology cluster websites. We encountered some problems in the data collection process. In most cases the contact details (e-mails and telephone numbers) of individual firms obtained from the UKSPA/UKBI websites were wrong and e-mails were bouncing. We tried our best to overcome this problem and increase our responses but at the end after at least three reminders and careful planning we managed only 133 usable responses.

Using internet as a data collection tool is quite new. It has both its merits and demerits. Among the advantages we can say that it is fast, almost free (if you have

internet connection), trendy, bulk free, easy follow up, technologically relevant to TBSFs and easily manageable. Postal and telephone surveys on the other hand can be very expensive, time consuming, bulky and old-fashioned. On the other hand demerits of electronic surveys include the blocking of e-mails by Internet Service Providers (ISPs), respondents may not open e-mails from unknown or un-trusted sources due to the fear of viruses, there are privacy issues as many respondents believe that transmitting valuable and confidential information may be viewed by others and there are methodological problems such as sampling bias.

Whatever the strengths and weaknesses of a chosen methodology for data collection, it is true that no research design will be perfect since all involve compromises. For instance, all researchers, particularly individuals working alone (such as PhD students) have to accept that their resources are finite. Often researchers admit, ex post facto, that if they were starting again, they would amend or even choose a different research design to the one they actually used (Curran and Blackburn 2001, p. 87).

However, in spite of a very small sample we believe that this paper will contribute to the existing knowledge and increase our understanding about the financing of UK TBSFs in software and biotechnology sectors.

4. Empirical evidence:

4.1 Demography and taxonomy of sample firms

Figure 1 shows that the highest level of qualifications among biotechnology firms is doctorate (22% compared to 10% software firms). However in terms of undergraduate, graduate and postgraduate education, software firms shows higher qualifications than biotechnology firms. The highest doctorate qualifications may indicate that biotechnology entrepreneurs are scientists and their products/services may encounter different impediments (particularly accessing external funds) than software firms at the early stages of business development.

Figure 1: Level of qualifications between software and biotechnology small firms

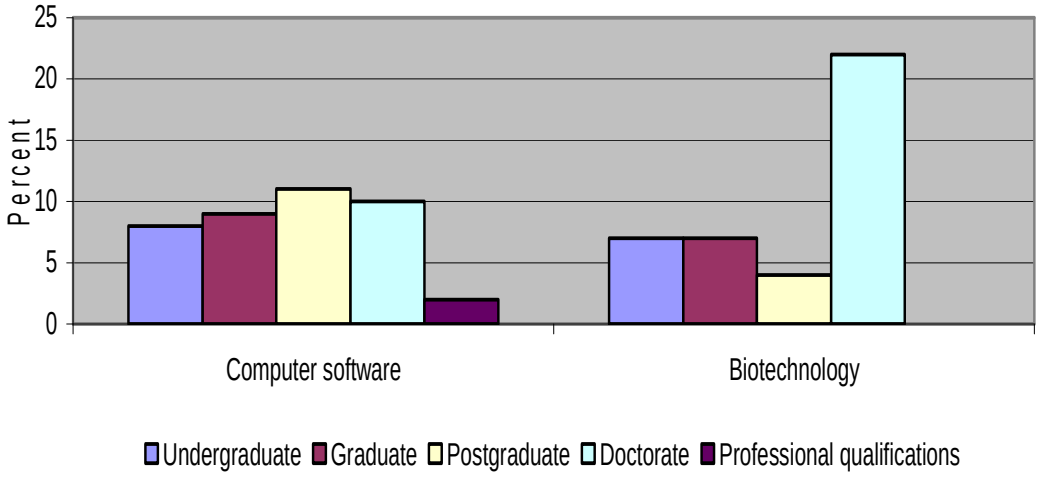


Figure 2 provide information on the age distribution of respondents. It is clear that for computer software firms most of the respondents are in the three age band 26-30, 31-35 and 36-40. Software entrepreneurs are also higher in the age band 20-25 compared to

biotechnology firms. Biotechnology entrepreneurs are mostly in the age band 31-35, 36-40 and 41-45. Majority of software entrepreneurs are in the age band 36-40 and for biotechnology they are in the age band 41-45. Biotechnology entrepreneurs are also more in numbers at the age band 46-50 compared to software entrepreneurs. The figure indicates that software entrepreneurs are comparatively younger than the biotechnology entrepreneurs and this may have important implications for finance. Financiers may perceive that being young would mean less experience, less competence, and lower business and management skills whilst biotechnology entrepreneurs who are older may mean more experience, having business and management skills, which many finance providers expect from entrepreneurs. However, being young also mean more energetic, sharp and committed which are good attributes for business success. This may have important implications for both policy makers and finance providers.

Figure 2: Age distribution of respondents between the two groups

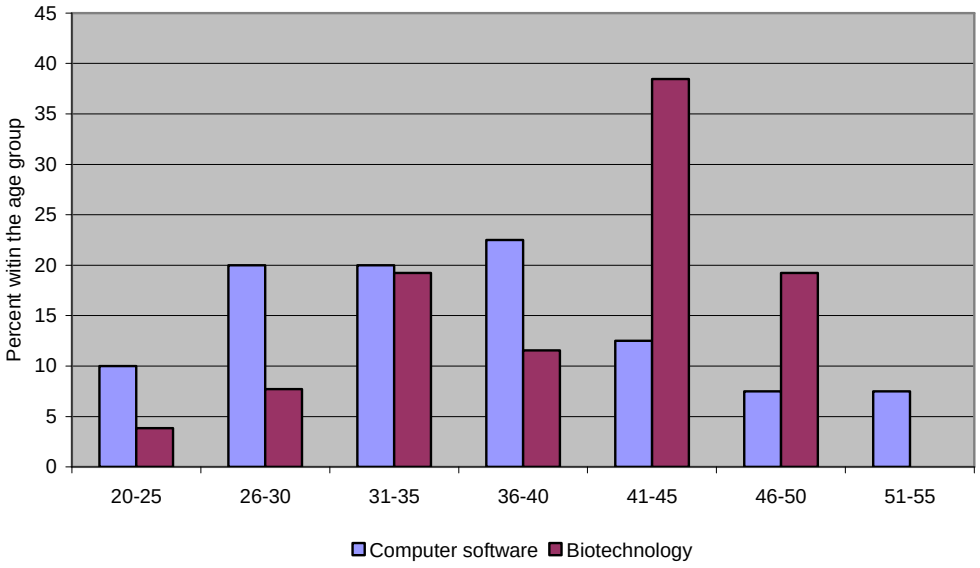
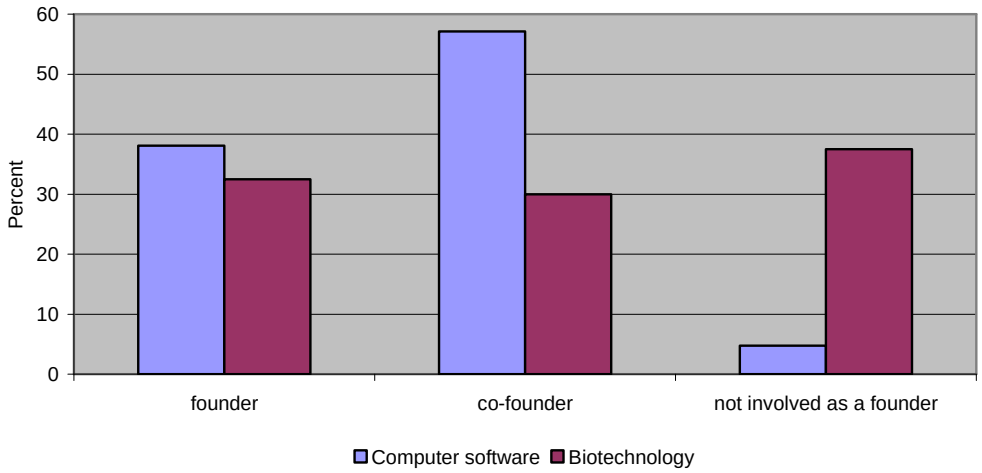


Figure 3 provides information on the founder co-founder of the two groups in this study. It is clear that among software firms higher numbers of founders and co-founders are still present compared to biotechnology firms. Interestingly significant numbers of biotechnology entrepreneurs (38%) compared to software entrepreneurs (5%) reports that they were not involved as founders in establishing the business.

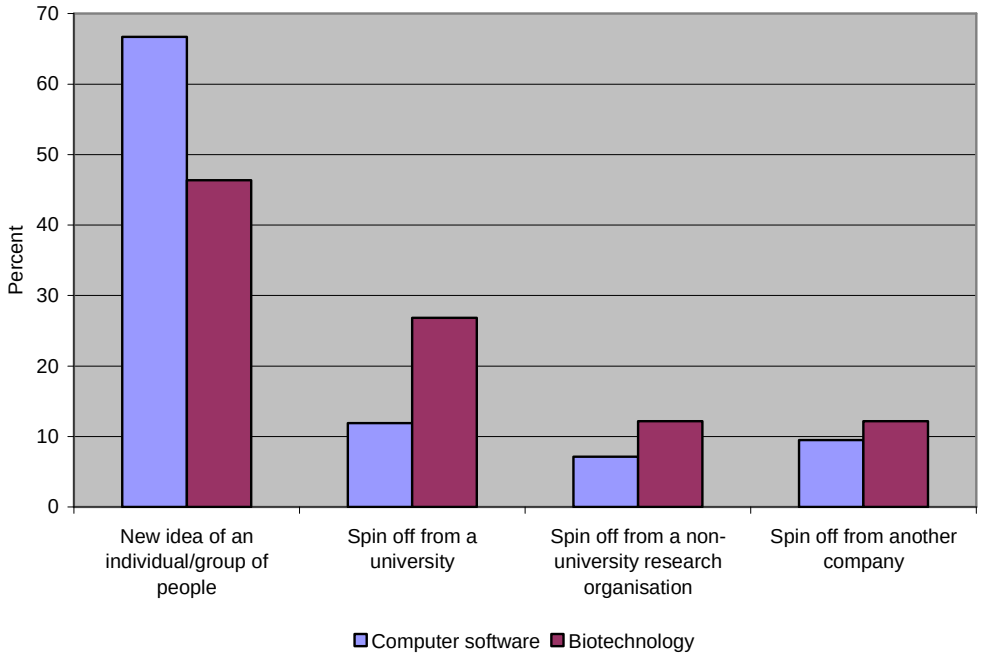
Figure 3: Founder and Co-founder between the two groups



This structure of sample businesses may have important implications for finance as founders have strong views about their businesses than non-founders. Keeping control of the business may be more important for founders than non-founders which may consequently impact the attainment of equity finance as equity providers may be demanding higher stakes in the business.

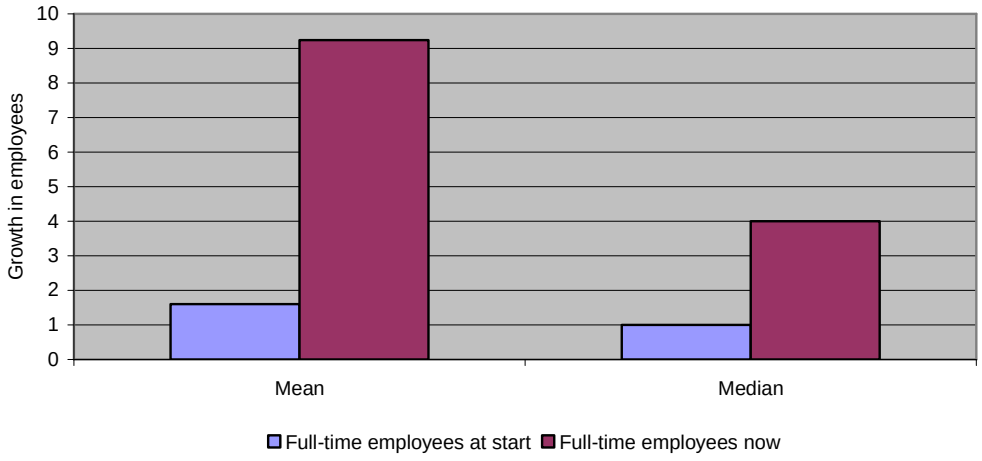
Figure 4 shows the business origins of the sample firms. The figure indicates that majority of software businesses (67%) are established as new ideas of individuals or group of individuals compared to 46% for biotechnology firms. Another important feature of biotechnology firms in this study is that higher percentages of these firms are spin-offs from universities (27% biotechnology compared to 12% software), non-university research organisation (12% biotechnology compared to 7% software) and corporate spin-offs (12% biotechnology compared to 10% software). It is important to note that spin-offs may have an advantage of getting funds from public sources as research work undertaken in academic or other institutions may be supported from public funds. Even in the case of corporate spin-offs, parent companies may provide financial assistance to newly established firms. In such a situation the computer software firms are relatively at a disadvantage to access funds for early stage development as they are established as a result of individual or group of individuals own ideas.

Figure 4: Business origin of the respondent firms



High technology firms are also high growth firms. Figure 5a and 5b tells us about the employee growth in the two groups. The full-time employee growth in figure 5a indicates that among software firms there is a significant growth of employees (both mean and median) since start-up. However, these firms are still very small (micro firms having less than 10 employees) and managed by the original founder co-founder as explored earlier.

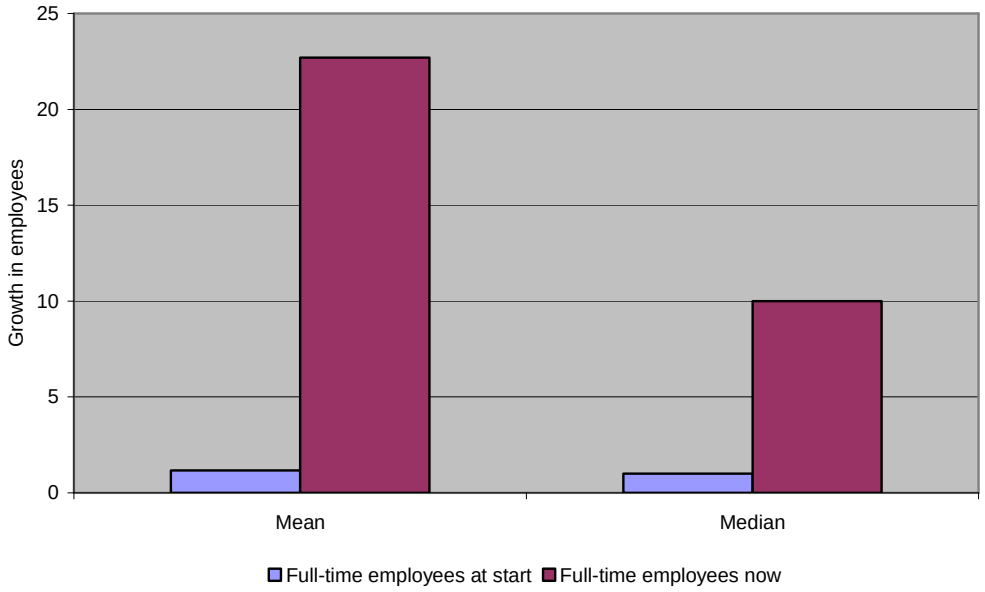
Figure 5a: Number of full-time employees at start and now for software firms



For biotechnology firms in this study, figure 5b shows that the growth (mean and median) in full-time employees has gone up considerably. These firms seem to have

grown considerably more compared to software firms as they have crossed the limit for micro firms.

Figure 5b: Number of full-time employees at start and now for biotechnology firms

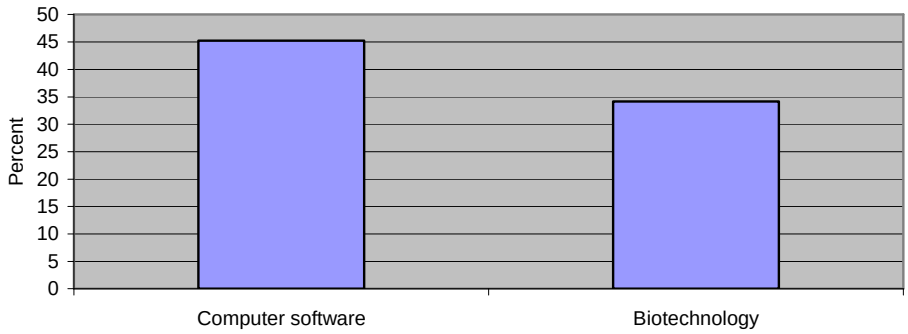


It seems that they are now small firms having more than 10 but less than 50 employees. This also confirm the findings in the previous figures which showed that these firms are established as a result of research in universities and other organisations and may be currently managed by majority shareholders and not original founders. This has important implications for the capital structure of the firms as shareholders may be more willing to seek external finance than the founders who 'would wish to keep control of the business' at the expense of growth.

4.2 Funding environment of the software and biotechnology firms

Figure 6 explores the issue of funding for the two groups in this study. It is clear that computer software firms report higher refusal rates than biotechnology firms.

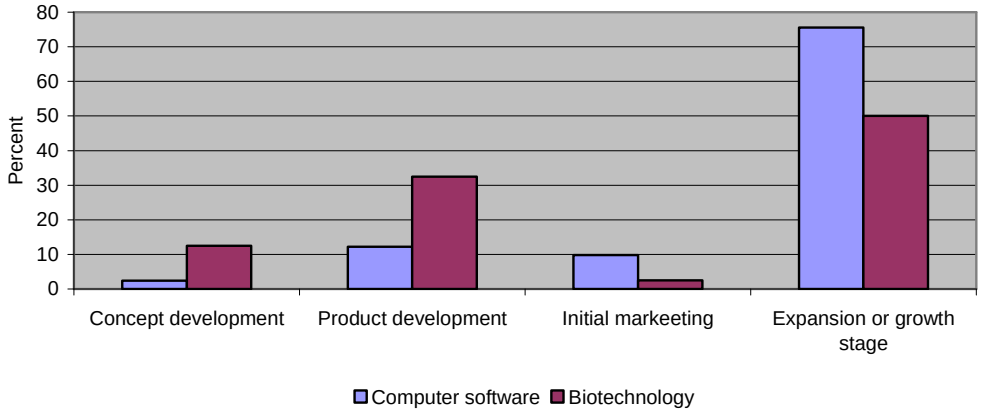
Figure 6: Respondents who were refused finance



This may be due to various reasons. For instance due to the burst of the software bubble in 2000, financiers are more risk averse than before and see these firms as more risky. Another reason may be that software products/services are highly risky and go out of date quickly and therefore financiers may think that before they reap the benefits of their investment the technology they are investing in might be too old. However, this may also be reflecting the findings in the previous sections where we found that software firms are different in many respects than the biotechnology firms which may be negatively influencing its financial problems.

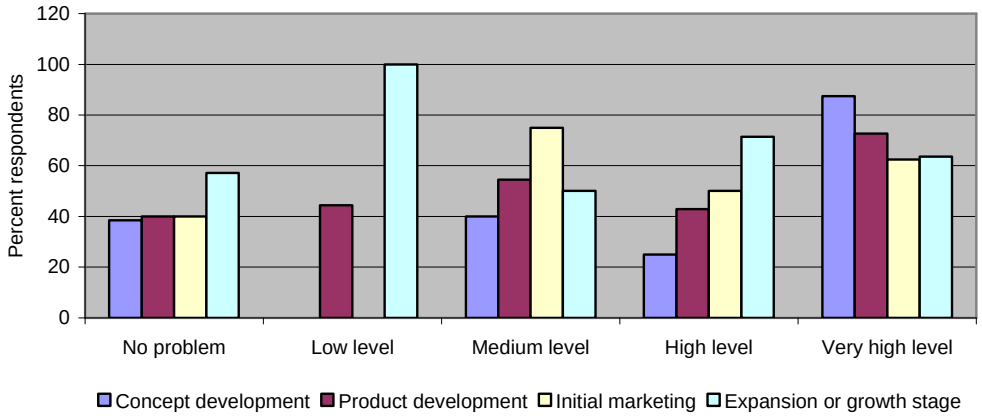
A common feature of technology-based firms is that they follow a certain path commonly known as life-cycle. This life cycle of TBSFs is analogous to the conception and development of a human baby. These firms usually originate from cutting edge research carried out in universities, higher education institutions and large companies. Prior to their full visibility in the market, they go through different phases of transformation and incubation. Figure 7 indicates these stages of development among the two groups in this study.

Figure 7: Stages of development between software and biotechnology firms



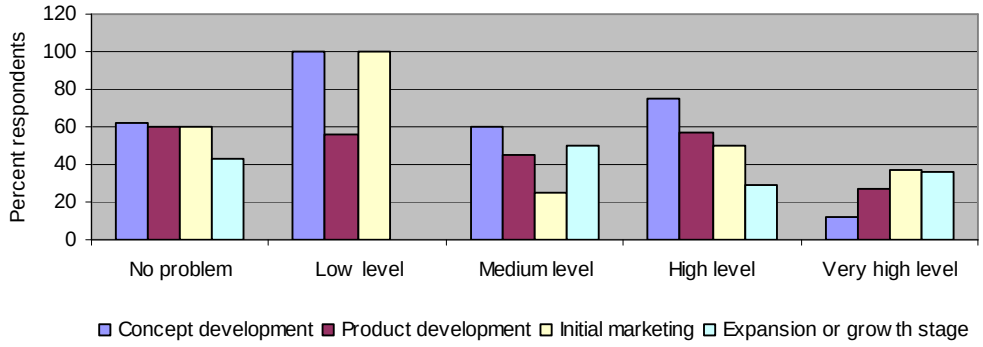
It appears that 76% computer software firms are at the expansion stage of development compared to 50% of biotechnology firms. The figure also reflects the transitory nature of software firms and the gradual development of biotechnology firms. Understanding these developmental stages of sample firms is helpful in knowing at what stage of development TBSFs are most financially constrained. In order to avoid confusion, we report the degree of financial difficulties in two separate figures for the two groups. Figure 8a shows the degree of financial difficulties for software firms. It is clear that software firms are experiencing highest financial difficulties at the concept development (88%) and product development (73%) and moderate financial difficulties at the initial marketing stages. At expansion stage firms become more credible, gains experience and get a foothold in the market. This increased visibility may positively influence the potential investors.

Figure 8a: The degree of financial difficulty for software firms



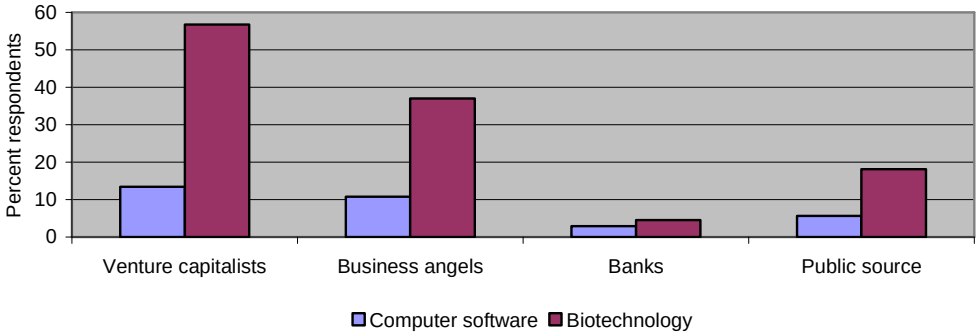
Similarly figure 8b for biotechnology firms shows a mixed picture of financial difficulties at various stages of development. However, firms still report (in descending order of strength) that financial difficulties are serious at concept development, product development, initial marketing and expansion stage which is a similar pattern to software firms but may be different in severity. This means that both groups have financial difficulties at earlier stages but with different strength greater for software than biotechnology firms).

Figure 8b: The degree of financial difficulty for biotechnology firms



Having established the fact that both groups of firms in this study reports funding difficulties at various early stages of development, the next issue is to explore what main sources of external finance have these firms attempted. Literature suggests that equity finance is more appropriate for TBSFs than debt. Some studies suggest that small firms follow a pecking order whilst financing their activities. Figure 9 shows the level of external finance (equity finance) for the two sample groups.

Figure 9: Main sources of equity investment in the two groups



This figure shows that the main sources of external finance such as VCs, business angels, banks and public sources are investing comparatively more in biotechnology firms than computer software firms. Software firms seem at a disadvantage than biotechnology firms. This is very crucial finding for UK policy makers as the aim is to increase the mass of TBSFs in all high-tech sectors not just biotechnology. This is also important for financiers as other countries such as US and Ireland have benefited enormously from investing in computer software firms.

Figure 10 informs us about the extent of difficulty encountered by the two groups in securing external finance. It is indicated that computer software firms reports the highest difficulties in securing outside equity compared to biotechnology firms. This may lead us to believe that in the UK, computer hardware/software firms are finding it harder to secure funds for early stage business development than biotechnology firms. This also reflects and confirms the pattern found in the preceding figures in this study.

Figure 10: Level of difficulty in securing outside equity for software and biotechnology firms

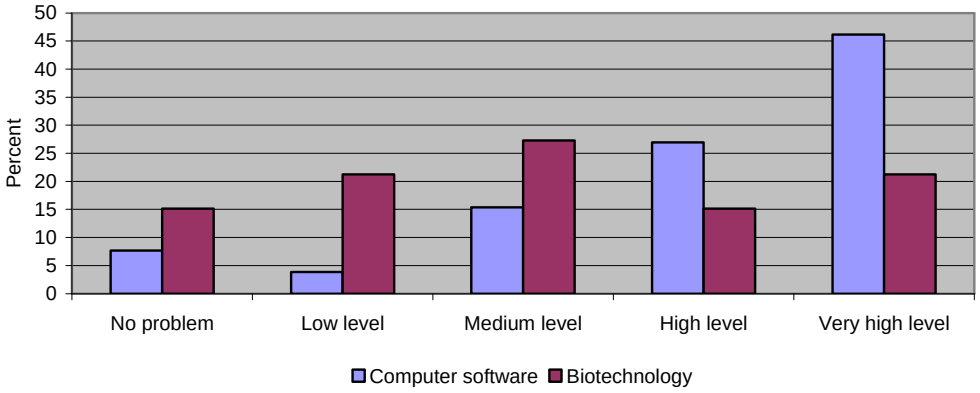


Figure 11a reveals the sources of finance used by the software firms. Personal savings is the main source of finance. The second most important source of finance is the VC finance and thirdly the house mortgage/re-mortgage. Previous studies also finds that personal savings of entrepreneurs is the most important source of finance at the start of the business. It is interesting that software firms are getting financial support only from small firms loan guarantee scheme (SFLGS) and not any from SMART (Small Firms Merit Award for Research and Technology) and SPUR (Small Products Under Research).

This is extraordinary as these schemes are aimed at providing financial support to young high technology firms at earlier stages. However, due to the smallness of our data it is difficult to draw general conclusions from these findings.

Figure 11a: Sources of finance used by the software firms

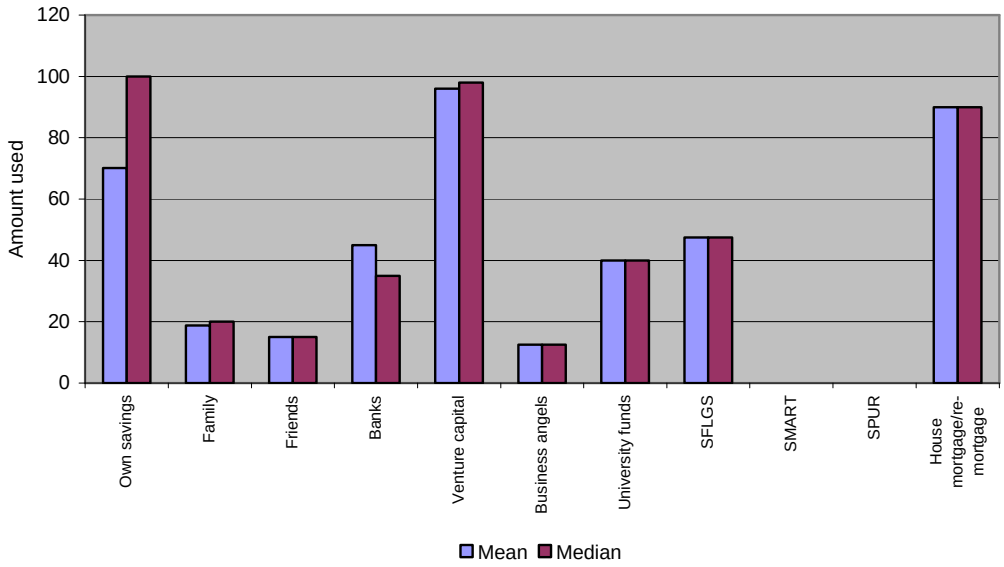
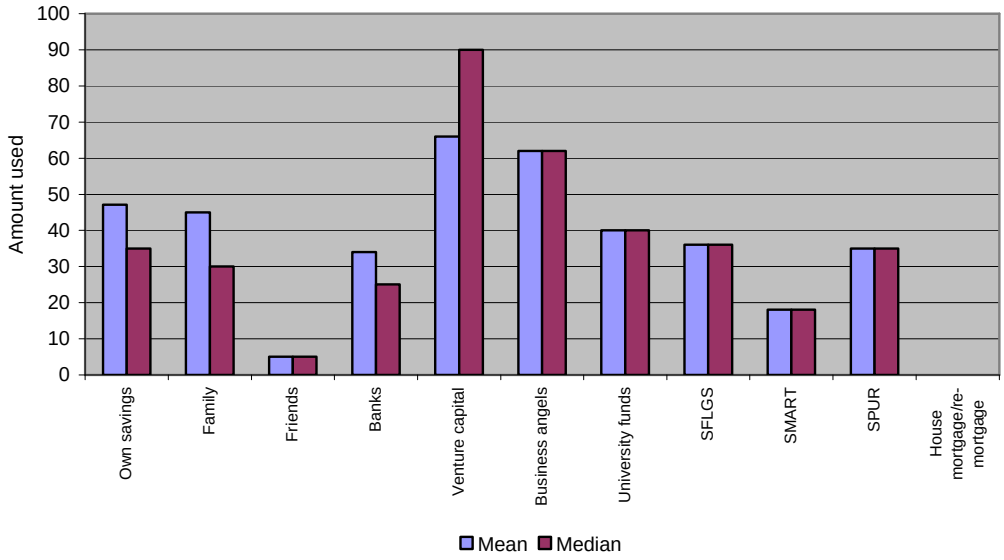


Figure 11b shows the sources of funding for biotechnology firms in this study. Both statistical measures show that VC finance is the most important source of finance for biotechnology firms. The second important source is the business angels. Personal funds and funds from family are important sources of early stage funding but not as highly important as it is for software firms. Other interesting finding is that in addition to SFLGS, SMART and SPUR schemes are also investing in biotechnology firms in this study. However, house mortgage/re-mortgage is totally non-existent as a source of funding for biotechnology firms. Once again to draw definitive conclusions from this small sample data is difficult.

Figure 10b: Sources of finance used by the biotechnology firms



5. Conclusions and discussions:

This paper has explored the important issue of funding for UK software and biotechnology small firms. Although the sample size is very small but is quite acceptable for qualitative survey studies. Software and biotechnology sectors are the two main groups of high technology population in the UK. This enables us to draw some broad conclusions.

With regards to the entrepreneurs' demography and their ventures characteristics we found that majority of biotechnology entrepreneurs' holds doctorate level qualifications which may be reflecting the scientific base of their businesses. Software firms show higher levels of graduate and postgraduate qualifications. The age distribution shows that software entrepreneurs are comparatively younger (31-35) than biotechnology entrepreneurs (41-45). Computer software entrepreneurs are more likely to be founders and co-founders of their businesses than the biotechnology firms. Biotechnology entrepreneurs are more likely not to be involved as the founders of the businesses they are managing currently. An overwhelming majority of software firms (67%) compared to 46% for biotechnology firms are being established as a result of individuals/group of individuals' personal ideas. Biotechnology firms are more likely to have been created as spin-offs from universities, non-university research organisations and or parent company spin-offs. The employees' growth shows that both groups are high growth firms and since start-up have grown considerably. These characteristics have important implications for finance.

The finance section has explored some important trends both for software and biotechnology firms mirroring the sector characteristics found in section 4.1. The refusal rates for securing funds at start-up are higher for software firms than the biotechnology firms. Software firms are comparatively growing faster than biotechnology firms and majority are at the expansion stage of business development. Biotechnology firms are showing a gradual growth but comparatively lower.

Software firms report higher financial constraints at the concept development and product development stages whilst biotechnology firms report that they were comparatively less severely finance constrained at these stages. The four main sources of funding such as VCs, BAs, banks and public sources are investing significantly more in

biotechnology firms than software firms in this study. The software firms report higher levels of difficulty in securing external sources of equity from these and such other sources. With regards to the sources of finance used, software firms reported that they have used personal sources, VC and house mortgage-re-mortgage as the principal sources of finance for their early stage of business development. Public sources such as SFLGS are used only by a small minority of software firms. Biotechnology firms on the other hand reported that the main sources of early stage funds constitute VCs and BAs as the principal sources of funding. Public sources such as SFLGS, SMART and SPUR are investing comparatively more in biotechnology firms than software firms. House mortgage-re-mortgage is not a popular source of funding at all for biotechnology firms.

These explorative findings suggest that the two sectors of HTSFs studied in this paper have distinctive features and hence may have different need for finance. This is important both for financiers and policy makers in the sense that they should be treated and understood differently. Although both sectors are high-tech and high growth firms and are birds of a feather but may not flock together.

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