COMPETITION & CHANGE, Vol. 13, No. 1, March 2009 3–28

On the Choice and Success of Competitive Strategies

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It is a central claim of the national competitiveness literature that firms exploit the comparative advantages of their environment by choosing to pursue that product market strategy which is facilitated by national financial and labour market institutions. Otherwise, so the further argument of the literature goes, firms are punished in that institutionally unsupported strategies are less successful and therefore not sustainable in the long run. My analyses of pharmaceutical firms in Germany, Italy and the UK challenge these arguments on the choice and success of competitive strategies. Given that different measures of strategy success do not indicate that the latter is in line with national institutional advantages, I develop an alternative explanation for the strategy choices of firms. Based on qualitative interviews with managers, I argue that technological opportunities to transform inventions or imitations into marketable products are of major concern when entrepreneurs choose their firms' strategy.

KEY WORDS Competitiveness theories, Varieties of Capitalism, Competitive strategies, Corporate success, Strategy choice, Institutions, Pharmaceutical industry

National Institutions as Drivers of Strategy Choice and Sustainability?

Beginning with the trade theorem of Heckscher and Ohlin (Heckscher 1919; Ohlin 1933), a broad literature on national corporate competitiveness has developed that, today, embraces strands as diverse as neo-liberal theory (Sinn 2005), strategic management studies (Porter 1990), theories on national innovation systems (Lundvall 1992b; Nelson 1993; Pavitt & Patel 1999), and the literature on varieties of capitalism (Amable 2003; Hall & Soskice 2001b; Hancké et al. 2007). Despite their different foci, all these strands agree in that economies are differently endowed with input factors, which, in turn, are required for particular competitive strategies. While the originators of this literature consider how the abundance of labour and capital influences corporate production decisions (Heckscher 1919; Ohlin 1933), its subsequent developers distinguish between different types of these production factors and illustrate how they facilitate strategies of radical product innovation, high quality production and low cost production, respectively. Since national corporate governance and labour market institutions are found to influence the availability of these crucially required factor types, the four above mentioned strands of the national competitiveness literature furthermore concur in the claim that firms choose to exploit the comparative institutional advantages of their economy and embark on the institutionally facilitated strategy.

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DOI: 10.1179/102452909X390583

More concretely, the institutional environment of *co-ordinated economies*, like Germany or Sweden, is said to facilitate competition through *product quality*. Collective bargaining procedures between the social partners do not only entail comparatively high and homogeneous wages; they also facilitate an education and training system that provides employees with highly specific vocational skills. The latter are at the root of extraordinary labour productivity and high value-added strategies. Since the corporate governance system grants shareholders important control rights, managers cannot take major financial decisions at short notice, which is necessary to rapidly invest in, or divest from, radically innovative projects. Yet, firms have access to 'patient' capital, required for incrementally innovative projects, because major stakeholders – such as banks, suppliers, employees or the founding family – also tend to be major shareholders. Co-operation enhancing labour market institutions and corporate governance systems thus constitute important comparative advantages that motivate firms to specialise in strategies of high quality production.[1]

The opposite applies to *liberal economies*, like the UK or the US, where the institutional setting is found to motivate competition through *radical innovation strategies*. Since collective bargaining processes are decentralised, it is difficult to put in place an education and training system where firms collaborate to provide trainees with specific skills. But, wages are flexible. High bonuses can therefore be paid to motivate employees to relentlessly develop radically new innovations. Furthermore, deregulated financial markets give firms easy access to share capital. This, however, needs to be invested in (radical innovation) projects promising high returns in the short run because, if the profit expectations of shareholders are not fulfilled, the latter rapidly withdraw funds as they have only reduced monitoring possibilities to understand how their investment is used. Flexible labour markets and deregulated corporate governance systems thus seem to offer compelling comparative advantages for strategies of radical product innovation.[2]

Finally, firms in – what I term here – *low-investment economies*, like Italy, Spain or Greece, are likely to specialise in the pursuit of *low cost strategies*. Where labour market institutions allow for comparatively low wage levels, employers are unlikely to participate in sophisticated education and training programmes, while employees, once they have finished compulsory schooling, often decide to start working rather than to invest in further education. Whenever opportunities for low wage levels are coupled with non-transparent financial market institutions, firms are furthermore likely to engage in low cost production as share capital and bank credits, required for radical and incremental innovation alike, are difficult to obtain. Firms in low investment economies seem thus best advised to exploit the cost advantage of the economy, by choosing to specialise in low cost strategies.[3]

The view of firms as institution-takers, on which this reasoning is based, makes it difficult to explain how a substantial number of firms can pursue competitive strategies that are not supported by national institutions. Therefore, the national competitiveness literature is puzzled with the question of how radically innovative high-tech industries could develop in ideal-typical rigid or low-investment economies like Germany or Italy. Yet, as a matter of fact, a highly innovative biotech industry has grown in both countries since the mid-1990s (Ernst & Young 2006; Pozzali 2004). Sticking to this constraining perception of national institutions, competitiveness scholars argue that the attempt to engage in radical product innovation can only be of a temporary nature in these economies. In the long run, such attempts are condemned to failure. In other words, radical innovation strategies are expected to be less successful in rigid and low-investment economies like Germany or Italy than in flexible economies like the UK, and are therefore not sustainable in the long term.[4]

This paper challenges the arguments on both *strategy choice* and *strategy success*. Beginning with analyses of the latter, I show that the success (measured in terms of both accounting performance and the sustainability of the initial legal status) with which firms pursue different strategies in the UK, Germany and Italy is not influenced by the national institutions of these economies. Given that the decision to pursue strategies unsupported by national institutions is not punished by limited success, the question about alternative explanations for *strategy choice* arises. Systematic comparisons of entrepreneurial decision-making processes show that firms choose their strategy on the basis of technological opportunities, i.e. on the basis of the inventions made by scientists and the facilities available for developing these inventions into marketable products. Depending on their innovation results, entrepreneurs thus decide to engage in radical product innovation, incremental product innovation or low-cost imitation.

I illustrate these points through quantitative and qualitative analyses of pharmaceutical firms – including biotech, traditional pharmaceutical and generics firms – in Germany, Italy and the UK. The reasons for this empirical focus are twofold: regarding the choice of *industry*, it is possible to identify the competitive strategies of pharmaceutical firms in a straightforward way due to the scientifically established notion of a New Chemical Entity (see the second section). Regarding the choice of *countries*, it is important to note that patent legislation, as well as pharmaceutical health and safety regulation, are strict but homogeneous throughout the EU zone following the establishment of the European Medicines Agency in 1995 (BAH 2006; Casper & Matraves 2003: 1868; EMEA 2006). Since it is the aim of this paper to test the hypotheses of the competitiveness literature on how national institutions impact on competitive strategies, legislative factors that influence corporate strategies need to be controlled for. Consequently, only pharmaceutical firms within the institutionally most different amongst the legislatively harmonised EU member states have been investigated. According to the national competitiveness literature, those economies that offer the most facilitative institutions for radical innovation, high quality and low cost strategies are Germany, Italy and the UK.

The paper is organised as follows. The second section first analyses whether firms in different economies specialise in the same competitive strategy. Finding this not to be the case, the third section enquires into strategy success by analysing whether firms perform less well and are less sustainable if they choose to pursue competitive strategies that are not supported by national institutions. Since empirical evidence does not support this idea, the fourth section proposes an alternative explanation for strategy choice. By examining three sets of the most different firms, the section illustrates that they all agree in one central point: entrepreneurs choose their firms' strategy on the basis of its technological opportunities. The fifth section summarises and interprets the various findings.

One Economy, One Competitive Strategy?

To obtain a benchmark for strategy stability on the one hand, and strategy choice on the other, we need to understand to which extent firms in the same economy specialise in the same competitive strategy, as proclaimed by the national competitiveness literature. To this end, we first need to identify different strategies. In line with the literature, I understand a competitive strategy as a process that leads to the emergence of a good, which, in turn, gives the producing firm a sustainable advantage in the market.[5] Deductive reasoning combined

with insights of the national competitiveness literature teach us that a firm can obtain a sustainable advantage either from selling an *entirely new good*, or from selling an *already existing product*. However, if the product is already known to the customer it has to be either *of a better quality* or *cheaper* than rival products. Hence, a sustainable advantage results from selling a *radically new*, an *incrementally new* or a *cheaper standard good*. Accordingly, I distinguish between three competitive strategies: *Radical Product Innovation* (henceforth RPI), based on a radical technological innovation; *Diversified Quality Production* (henceforth DQP), based on an incremental technological innovation; and *Low Cost Production* (henceforth LCP), based on technological imitation.

This conceptual distinction can be applied in a particularly straightforward way to pharmaceutical firms[6] in order to identify their competitive strategies due to the scientifically acknowledged notion of a New Chemical Entity (henceforth NCE). An NCE, simply, constitutes a chemical entity that has not been discovered before. It is scientific practice to indicate whether active or excipient ingredients of a pharmaceutical product constitute an NCE, a modification of an already discovered chemical entity or, simply, an imitation. Using the classification of pharmaceutical products according to the newness of their employed chemicals, I propose the following differentiation between competitive strategies (see Bottazzi et al. 2001: 1162–1167). Pharmaceutical firms inventing drugs based on an NCE pursue RPI strategies, whereas firms improving already discovered chemical entities engage in DQP. Finally, firms that do not engage in R&D, but focus on imitating innovations made by others, pursue LCP strategies.

In order to identify the competitive strategy of pharmaceutical firms in Germany, Italy and the UK, the PHID database offers the most complete empirical basis.[7] It keeps track of 16,751 pharmaceutical projects carried out by 3522 firms and public research organisations in seven countries.[8] The latter include Germany, Italy and the UK, in addition to France, Japan, Switzerland and the US.[9] In these countries, any firm is recorded as soon as it has been involved in at least one pharmaceutical project that has reached the stage of preclinical development since the 1980s. Therefore, firms whose pharmaceutical projects are/were not granted patent protection are also included in the database. However, (generics) firms that do not engage in R&D but imitate the pharmaceuticals of competitors are not recorded. Finally, pharmaceutical firms are considered only if their projects translated into therapeutic drugs curing or alleviating human diseases. Firms that are active in the service sector, such as platform-technology suppliers, are not considered.

Importantly, a new drug is often not developed by a single firm. Instead, the process leading to the launch of a new product is characterised by a remarkable division of labour (see Gambardella et al. 2001: 36–53). While biotech firms tend to specialise in up-stream research activities, down-stream development activities are typically taken over by traditional pharmaceutical firms (see Bottazzi et al. 2001; Orsenigo et al. 2001; Owen-Smith et al. 2002; Pammolli et al. 2002). The PHID database takes this labour division into account by distinguishing between *developers*, *licensors* and *licensees* of pharmaceutical products. A *developer* is a firm with a fully integrated value chain carrying out all stages on its own. A *licensor*, by contrast, initiates a project, which ultimately translates into a new drug. However, focusing on up-stream activities (i.e. on discovery, preclinical and early clinical development), the licensor decides at a certain point to licence its discovery to another firm, which continues the drug development process. Accordingly, a *licensee* focuses on the stages of (late) clinical development, registration and marketing in order to translate the respective discovery into a marketable drug.

This distinction makes it possible to identify RPI, DQP and LCP strategists as follows:

- RPI strategists are the *developers* or the *licensors* of pharmaceutical projects that translate into a drug based on an NCE. Since the discovery of the NCE is made by the licensor, the latter is *radically innovative* irrespective of the stage at which it decides to out-license the pharmaceutical project.
- Following this logic, a firm pursues a DQP strategy whenever it is the *developer* or *licensor* of a pharmaceutical project that improves a previously discovered chemical entity. In addition, a firm also pursues a DQP strategy if it *in-licences* a pharmaceutical project based on an NCE *at the stage of clinical development*. At that moment, the previously unknown chemical entity has been discovered. Accordingly, it is the task of the licensee to improve the entity in such a way that its effectiveness and dosage are optimised. In sum, both licensees of a clinical development agreement and developers or licensors of an improved drug pursue a DQP strategy as they are not radically but *incrementally innovative*.
- This leaves us with a third group of firms in-licensing pharmaceutical projects with the aim of registering and marketing both radically or incrementally new drugs. These firms concur with generics firms in that they abstain from expensive research and development activities. Hence, their strategy consists of producing and selling drugs at the *lowest possible costs*.

Applying this sampling strategy to those British, German and Italian pharmaceutical firms, which have been involved in at least one pharmaceutical project since 1985,[10] leads to the results reported in Table 1. A detailed list of those firms that qualified as RPI, DQP and LCP strategists is provided in the Appendix (see Table A1 for the UK, Table A2 for Germany and Table A3 for Italy).[11]

Contrary to the expectations of the national competitiveness literature, Table 1 does not provide empirical support for the idea that the majority of firms in the same political economy specialise in the same competitive strategy. While 47.5 per cent of pharmaceutical firms pursue an RPI strategy in the UK, 39.4 per cent of firms pursue this strategy in Germany and 34.5 per cent of their counterparts do so in Italy. DQP strategies, in turn, are

TABLE 1

Summary results: RPI, DQP and LCP strategists in the UK, Germany and Italy

	Radical product innovators		Diversified quality producers		Low cost producers		Total	
	No. firms	% firms	No. firms	% firms	No. firms	% firms	No. firms	% firms
UK	19	47.5	17	42.5	4	10.0	40	39.2
Germany	13	39.4	17	51.5	3	9.1	33	32.4
Italy	10	34.5	11	37.9	8	27.6	29	28.4
Total	42		45		15		102	100.0
Average	14	41.2	15	44.1	5	14.7	34	
Above average		6.3		7.4		12.9		

Source: PHID database, sampled in November 2004.

pursued by 51.5 per cent of German, by 37.9 per cent of Italian and by 42.5 per cent of British firms. Finally, the probability that firms pursue an LCP strategy is 27.6 per cent in Italy, 10.0 per cent in the UK and 9.1 per cent in Germany. In other words, the strategy patterns identified are very similar for the UK, Germany and Italy. Interestingly, though, Table 1 also reports that firms in different economies show slight preferences for one of the three strategies. British firms are 6.3 per cent more likely to engage in radical product innovation than the average pharmaceutical firm included in the sample. Similarly, the probability of pursuing a DQP strategy is 7.4 per cent higher for a German firm than for the sample's average company. Finally, Italian firms show a preference for low cost production, as they pursue this strategy 12.9 per cent more often than the average pharmaceutical company. Yet, a cross-tabular analysis, assessing the strength of association between a firm's *location* and the probability with which a specific *strategy* is pursued, shows that differences in specialisation patterns are too weak to produce statistically significant results ($\chi^2 = 5.996$ (two cells = 22.2 per cent with expected count less than 5); $p > 0.10$; Cramer's $V = 0.171$; $p > 0.10$). These findings run counter to the expectations of proponents of the specialisation argument, as they indicate that neither the majority nor a statistically significant plurality of firms pursue the same competitive strategy within the same economy.

Strategy Success

The previous results are telling in two respects. First, they indicate that firms do not choose to pursue *that* competitive strategy for which national institutions provide the required input factors. British pharmaceutical firms do not specialise in RPI, even though deregulated financial and labour markets offer easy access to share capital and employees with general qualifications.[12] Neither do German firms chiefly engage in DQP only because regulated financial markets provide them with patient capital, while rigid labour markets motivate employees to acquire specific qualifications.[13] Also, Italian firms do not specialise in LCP, even though wage levels are low in comparison to other European Monetary Union member states and, hence, a source of 'cheap' labour, while non-transparent financial market institutions make access to larger sums of capital difficult.[14]

Second, these findings provide empirical support for the initially mentioned phenomenon: that radically innovative biotech industries have developed in rigid and low-investment market economies like Germany and Italy. Seeking to explain this puzzle from a functionalist perspective, the national competitiveness literature argues that radically innovative industries in these economies perform less well and are thus not sustainable in the long run.[15] Paying tribute to this argument, it has to be said that the previous analyses only report that British, German and Italian pharmaceutical firms pursued an RPI, DQP or LCP strategy at some point between 1985 and 2004. However, this static overview does not say anything about the *success* with which RPI, DQP and LCP strategies are pursued in different institutional environments. It could be possible that firms choosing a non-conformist strategy are punished for their decision by failure in the long run. In other words, whenever firms neglect to exploit the advantage of pursuing the institutionally facilitated strategy, they are less competitive and sooner or later fail.

To shed light on this question, the two following subsections analyse how successful RPI, DQP and LCP firms are in different institutional environments. In so doing, the third section considers two different indicators of corporate success: accounting performance and

change in legal status. In other words, 'Synchronic Analyses of Strategy Success' studies strategy success from a synchronic perspective by comparing various accounting ratios of RPI, DQP and LCP pursuers in Germany, Italy and the UK. 'Diachronic Analyses of Strategy Success' proceeds to diachronic analyses of strategy success, as it investigates the sustainability of the initially pursued strategy: are firms more likely to merge, be acquired or go bankrupt if they pursue strategies that are not supported by national institutions?

The firm sample on which these analyses are grounded is, mostly, the one I derived from the PHID database (see the second section). To obtain more representative results when assessing strategy success on the basis of this PHID sample, I increased the latter in two ways. First, I added generics firms that are not considered in the PHID database because they abstain from R&D activities. More precisely, I included the entire population of British, German and Italian generics producers, which, in November 2004, could be identified as genuinely national firms, having their headquarters in, and concentrating their activities on, the national territory of the respective country (Wittner 2003: 51–54, 70–73, 133–134). Hence, I added six British,[16] nine German[17] and two Italian[18] generics producers to the dataset and classified each of them as a low cost producer. Second, I added German and Italian biotech firms as they were underrepresented in the initial sample compared to their British counterparts (see Tables A1–A3 in the Appendix). The reason for this is that the British biotech industry began to crystallise in the 1980s – much earlier than its German and Italian counterparts, where most biotech firms were founded in the mid-1990s and, respectively, around the turn of the millennium. Therefore, many German and most Italian biotech firms had not yet brought a pharmaceutical project beyond the stage of preclinical development and, hence, were not yet registered in the PHID database when I sampled the latter in November 2004. To obtain a more homogeneous sample, I randomly added three German[19] and eight Italian[20] biotech firms, using data provided by Ernst & Young (2002: 15–19) and the 'Italian Biotech Database' of Venture Valuation (2006) as a sampling basis. I identified the firms' strategy (RPI or DQP) by comparing the classification of Ernst & Young (2002: 15–19) with that of Lange (2006), by consulting the firms' web pages and by talking to their representatives.[21] By adding these 17 generics and 11 biotech firms, the initial sample of 102 pharmaceutical firms was increased to 130.

Synchronic Analyses of Strategy Success

Do firms perform less well if they pursue a strategy that is not supported by national institutions (see Hall & Gingerich 2004; Hall & Soskice 2001a: 17–21)? From a synchronic perspective, one way to answer this question is to compare the accounting performance of the 130 aforementioned RPI, DQP and LCP strategists. More precisely, I compared how these firms perform in six accounting ratios that are part of the most important indicators used by analysts to evaluate the financial conditions of a firm. They include:

- *Return on shareholders' funds*, a measure of corporate profitability that indicates how much profit a firm has generated with the money shareholders have invested.
- *Return on capital employed*, a ratio that reveals the profitability of a firm's capital investments.
- *Profit margin*, a ratio of profitability that indicates how much out of every dollar of sales a firm obtains in earnings.
- *Current ratio*, a liquidity ratio that measures a firm's ability to pay back its short-term liabilities (debt and payables) with its short-term assets (cash, inventory and receivables).

- *Solvency ratio*, an indictor used to measure a firm's ability to meet long-term obligations.
- *Gearing*, an indicator that explains how a firm finances its operations either through outside lenders or through shareholders, whereby firms with a high gearing – i.e. with more long-term liabilities than shareholder equity – are considered speculative.

As a rule of thumb, one can say that firms perform better, the higher they score on each of these indices – with the exception of their gearing, where the opposite applies.

All ratios were obtained from the AMADEUS database, which contains financial information on 9 million public and private companies in 38 European countries (Bureau van Dijk 2004). It was possible to obtain accounting ratios for 73 of the 130 pharmaceutical firms included in the overall sample. Before grouping these 73 firms according to their strategy and country, I calculated each accounting ratio for each firm as an average value of the past five years in order to correct for temporary peaks.

Table 2 reports the results obtained. To find empirical support for the argument that national institutions influence the success of competitive strategies, Table 2 should reveal that RPI strategists perform particularly well in the UK, while DQP pursuers perform better

TABLE 2

Performance of RPI, DQP and LCP strategists in six accounting ratios

Group of firms	No. of cases	Return on shareholder' funds (%)[a]	Return on capital employed (%)[b]	Profit margin (%)[c]	Current ratio[d]	Solvency ratio (%)[e]	Gearing (%)[f]
RPIs UK	**11**	**-55.10**	**-58.13**	**-4.34**	**3.86**	**53.84**	**74.68**
DQPs UK	12	49.37	59.30	5.63	3.41	52.22	106.43
LCPs UK	7	-16.02	-84.27	-6.74	1.53	34.78	62.83
RPIs Germany	5	-34.07	-14.89	-16.72	7.89	66.77	36.01
DQPs Germany	**8**	**28.03**	**24.48**	**12.43**	**3.03**	**46.58**	**88.19**
LCPs Germany	3	169.49	42.22	12.95	1.31	25.29	856.68
RPIs Italy	8	-8.03	-7.30	2.36	3.19	43.34	196.84
DQPs Italy	13	20.77	18.50	10.33	1.50	40.37	78.32
LCPs Italy	**6**	**48.39**	**62.35**	**9.06**	**1.28**	**17.47**	**466.02**
RPIs overall	24	-35.03	-31.78	-4.92	4.48	53.03	112.07
DQPs overall	33	32.93	34.02	9.13	2.56	46.18	91.02
LCPs overall	16	42.92	-0.32	2.88	1.40	26.51	362.87
Total or Average	73	12.78	5.57	4.13	2.94	44.12	159.77

Source: AMDEUS database, as sampled in December 2004 (Bureau van Dijk 2004).

Notes:

[a] *Return on shareholders' funds* = profit or loss before tax/shareholders' equity.

[b] *Return on capital employed* = (profit or loss before tax + interest paid)/(shareholders' equity + non-current liabilities).

[c] *Profit margin* = profit or loss before tax/operating revenue.

[d] *Current ratio* = current assets/current liabilities.

[e] *Solvency ratio* = shareholders' funds/total assets.

[f] *Gearing* = (non-current liabilities + loans)/shareholders' equity.

than average in Germany, and LCP firms outperform their peers in Italy. Interestingly, though, this is not the case. For each of the six accounting ratios, British RPI strategists, German DQP pursuers and Italian LCP firms are usually outperformed either by firms pursuing different strategies in the same country or by firms pursuing the same strategy in different countries – or even on both accounts. Cross-tabular analyses confirm the findings presented in Table 2. To run these analyses, I calculated for each firm and each accounting ratio whether the respective RPI, DQP or LCP strategist performed better or worse than the average 73 firms for which data could be obtained. Cross-tabular analyses of the respective *average performance indicators* with the firms' *countries* and *competitive strategies* unambiguously lead to the same results. If statistically significant deviations are observable at all, they are not in line with the predictions of the contributors to the national competitiveness literature.[22] These results indicate that the institutional environment within which firms operate does not influence the success of competitive strategies.

Another noteworthy observation to be made on the basis of Table 2 is that RPI strategists perform overall rather poorly in all profitability ratios, including the return on shareholders' funds, return on capital employed and the profit margin. This, in turn, indicates that RPI, DQP and LCP strategies are characterised by a distinct investment–return profile, which is particularly evident in the case of radical product innovators. Given that it takes years before investment in research and development of pharmaceutical products becomes profitable, newly established RPI strategists do not usually make a profit in the first years of their existence. This seems to explain why their profitability ratios are comparatively low. However, the possibility that competitive strategies differ in their risk–return profile also indicates that comparisons of accounting ratios between firms pursuing *different* strategies might be of limited help in understanding whether national institutions influence strategy success, because part of the variations among strategies in these indicators might stem from the differences in risk–return profiles rather than from differences in the institutional environment.

It is thus useful to cross-check the findings presented in Table 2 through indicators that eliminate the possible influences of different risk–return profiles. To this end, the AMADEUS database offers additional indicators that can be taken as synchronic measures of strategy success. In the so-called peer report of the database, a firm is ranked in comparison to its ten most direct competitors according to six economic items on the one hand and six accounting ratios on the other. While the accounting ratios are the same as those described in Table 2, the six economic items include:

- The firm's *operating revenue* (in US$ thousands).
- Its *profit or loss before tax* (in US$ thousands).
- The annual *cash flow* (in US$ thousands).
- The firm's *total assets* (in US$ thousands).
- Its *shareholders' funds* (in US$ thousands).
- Its *number of employees*. Depending on how well a firm performs relative to its ten most direct competitors, it is thus assigned a score from 1 to 11, whereby higher scores indicate better performance.

Table 3 gives an overview of the peer performance of those 73 pharmaceutical firms for which data could be obtained from the AMADEUS database. For reasons of simplification, Table 3 does not report the scores of each of the 12 peer indicators separately. Instead, a firm's average position has been calculated for the six economic items on the one hand

TABLE 3

Performance of RPI, DQP and LCP strategists relative to their ten most direct competitors

Group of firms	No. of cases	Ø peer performance in economic items[a]	Ø peer performance in accounting ratios[b]	Group of firms ranked by position obtained	No. of cases	Ø peer performance in economic items and accounting ratios[c]
RPIs UK	**11**	**5.73**	**5.26**	DQPs UK	12	4.19
DQPs UK	12	3.65	4.73	DQPs Italy	13	4.48
LCPs UK	7	4.87	4.42	LCPs UK	7	4.64
RPIs Germany	5	4.39	4.95	RPIs Germany	5	4.67
DQPs Germany	**8**	**4.56**	**5.83**	RPIs Italy	8	4.74
LCPs Germany	3	5.89	4.50	**LCPs Italy**	**6**	**4.86**
RPIs Italy	8	4.44	5.04	**DQPs Ger.**	**8**	**5.19**
DQPs Italy	13	4.19	4.77	LCPs Germany	3	5.20
LCPs Italy	**6**	**5.28**	**4.44**	**RPIs UK**	**11**	**5.50**
RPIs overall	24	4.99	5.12			
DQPs overall	33	4.08	5.01			
LCPs overall	16	5.21	4.44			
Total / Average	73	4.62	4.92	Total	73	4.77

Source: AMDEUS database, as sampled in December 2004 (Bureau van Dijk 2004).

Notes:

[a] On a scale from 1 to 11, average of firms' ranking in *operating revenue* (in US$ thousands), *profit or loss before tax* (in US$ thousands), *cash flow* (in US$ thousands), *total assets* (in US$ thousands), *shareholders' funds* (in US$ thousands) and *number of employees*.

[b] On a scale from 1 to 11, average of firms' ranking in *return on shareholders' funds*, *return on capital employed*, *profit margin*, *current ratio*, *solvency ratio* and *gearing*.

[c] On a scale from 1 to 11, average of peer performance in economic items and of peer performance in accounting ratios.

(column 3) and the six accounting ratios on the other (column 4). These two performance indicators of RPI, DQP and LCP strategists in Germany, Italy and the UK are reported on the left-hand side of Table 3. In addition, the right-hand side of Table 3 ranks the respective groups of firms according to their overall peer performance, which, in turn, was calculated by averaging out the scores obtained in economic items and accounting ratios. In order to correct for temporary peaks, each peer performance indicator was calculated as an average value of the past five years for which data was available.

Table 3 shows that RPI, DQP and LCP strategists in Germany, Italy and the UK achieve fairly similar positions on both the economic items index (column 3) and the accounting ratio measure (column 4). On a scale from 1 to 11, the average positions range from 3.65 (DQP pursuers in the UK) to 5.89 (LCP firms in Germany). In other words, all the pharmaceutical firms observed perform worse than at least three, but better than six, of their most direct competitors – irrespective of the strategy they pursue and the country within which they are located. From the perspective of an entrepreneur, this result might be reassuring to the extent that the pursuit of any strategy seems to have about the same chances of success. From the perspective of the national competitiveness literature, though,

this result is challenging as it indicates that national institutions do not directly influence the success of corporate strategies. This idea is confirmed by the last three columns of Table 3, which rank the different groups of firms according to their overall peer performance. While one should keep in mind that differences between the individual positions are minor, it is striking to find British RPI strategists, German DQP pursuers and Italian LCP firms amongst those four groups of firms that perform least well. This finding, again, militates against the idea commonly advanced in the literature, that pharmaceutical firms perform less well if they pursue a strategy that is not supported by national institutions (see Hall & Gingerich 2004; Hall & Soskice 2001a: 17–21).

Diachronic Analyses of Strategy Success

It would however be premature to dismiss the idea that national institutions influence strategy success purely on the basis of synchronic analyses, as it could be possible that firms perform equally well at a certain point in time. But, once corporate performance is considered over time, it may turn out that some strategies fail more often than others, depending on the institutional environment within which they are pursued. This subsection thus proceeds to diachronic analyses of strategy success by enquiring into the frequency with which firms merge, are acquired and go bankrupt. Are the initially pursued strategies more sustainable – i.e. less susceptible to mergers, acquisitions and bankruptcy – if they are supported by national institutions providing the required input factors (see Casper 2007; Vitols 2001: 355–359)? To answer this question, this section first studies the sustainability of competitive strategies on the basis of the previously employed PHID dataset comprising 130 pharmaceutical firms. It then counterchecks the findings obtained on the basis of an additional dataset comprising biotech firms only.

Does the PHID sample provide empirical support for the idea that competitive strategies are less sustainable unless firms pursue RPI strategies in the UK, DQP strategies in Germany and LCP strategies in Italy? To answer this question, a retrospective check on each of the 130 pharmaceutical firms was carried out to see whether they have ever gone bankrupt, merged, been acquired or kept their original legal status over the course of the last 20 years, that is, between 1985 and 2006. Table 4 summarises the results. Since mergers and acquisitions (M&As) do not necessarily constitute instances of corporate failure, while bankruptcy does, Table 4 makes the following distinction. Columns 2 to 5 list all instances of bankruptcy and M&As separately, which are then added up and reported in columns 6 and 7 as instances of change in legal status. Columns 8 and 9 report the remaining number and percentage of firms that did not experience a change in legal status. Taken together, all instances of status change and status stability lead to the overall number of firms surveyed, as reported in columns 10 and 11.

Irrespective of whether M&As are perceived as instances of corporate success or failure, Table 4 indicates that firms go bankrupt, are acquired or merge independently of the competitive strategy they pursue within a given institutional environment. That national institutions providing required input factors do not seem to influence the sustainability of competitive strategies is particularly evident for all instances of bankruptcy. While bankruptcy is generally rare, the only instance that can be observed for Germany concerns a firm that pursued a DQP strategy. In Italy, bankruptcy is – in relative terms – most widespread among LCP pursuers. Only RPI strategists in the UK show signs of strategy sustainability in line with the expectations of the national competitiveness literature.

TABLE 4

Changes in the legal status of RPI, DQP and LCP strategists

Group of firms	Bankruptcies		M&As		Legal status change		Legal status stability		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
RPIs UK	**1**	**5**	**6**	**32**	**7**	**37**	**12**	**63**	**19**	**100**
DQPs UK	1	6	6	35	7	41	10	59	17	100
LCPs UK	2	20	3	30	5	50	5	50	10	100
RPIs Germany	0	0	2	13	2	13	14	87	16	100
DQPs Germany	**1**	**6**	**2**	**12**	**3**	**18**	**14**	**82**	**17**	**100**
LCPs Germany	0	0	5	42	5	42	7	58	12	100
RPIs Italy	1	7	2	13	3	20	12	80	15	100
DQPs Italy	1	7	0	0	1	7	13	93	14	100
LCPs Italy	**1**	**10**	**3**	**30**	**4**	**40**	**6**	**60**	**10**	**100**
RPIs overall	2	4	10	20	12	24	38	76	50	100
DQPs overall	3	6	8	17	11	23	37	77	48	100
LCPs overall	3	9	11	34	14	43	18	57	32	100
Total	8	6	29	24	37	30	93	70	130	100

Source: PHID database, sampled in November 2004; changes occurred between 1985 and 2006.

To assess statistically whether differences in the sustainability of competitive strategies vary significantly between countries, I carried out two cross-tabular analyses. As might have been expected on the basis of Table 4, the association between a firm's *country*, its *strategy* and the latter's *stability* (measured in terms of 'bankruptcy', 'M&A' and 'legal status stability' on the one hand,[23] and in terms of 'legal status change' and 'legal status stability' on the other[24]) is not strong enough to produce statistically significant results. Synchronic analyses therefore cast doubt on the idea that national institutions influence strategy success, even when the latter is understood as sustainability of a firm's legal status. In other words, firms seem to fail, change or maintain their legal status irrespective of the country in which they pursue RPI, DQP and LCP strategies.

Albeit only for firms pursuing RPI strategies, it was possible to countercheck these findings on the basis of the 'VentureXpert' database of *Thomson Financial* (2004). This database provides detailed information on a representative sample of firms in many western economies which have received venture capital since the early 1980s (Bernard 2006). As data can be sorted *inter alia* by country and industrial activity, it is possible to isolate those biotech firms that have obtained venture capital in the UK, Germany and Italy. These firms can be assumed to pursue an RPI strategy for two reasons. First, Tables A1, A2 and A3 show that the majority of RPI strategists are biotech firms (see the Appendix). Second, several studies illustrate that institutional share capital in general, and venture capital in particular, constitute the most important source of finance for RPI pursuers (see Bottazzi & Da Rin 2002; Gompers & Lerner 2004: Chapter 12; Herrmann forthcoming: Chapter 3; Kanniainen & Keuschnigg 2005). Firms that are active in the biotech industry *and* have received venture capital are very likely to pursue an RPI strategy.

While the sample obtained from VentureXpert for both Germany and the UK is representative, the one obtained for Italy needs to be completed. Since the Italian biotech

industry only started to take off around the turn of the millennium,[25] many firms were not yet included in the VentureXpert dataset when I sampled the latter in October 2004. To make up for this lack, I consulted the 'Italian Biotech Database' of Venture Valuation (Venture Valuation 2006). This database provides the most complete list of biotech firms that have received, or constitute attractive opportunities for, venture investment. In June 2006, it contained 34 firms. Like their British and German counterparts, these firms can be expected to pursue RPI strategies for the two aforementioned reasons: they are active in the biotech industry and constitute venture capital candidates. Yet, unlike VentureXpert, the Italian Biotech Database does not provide systematic information on bankruptcy, M&As and firms that have gone public. To reveal whether firms contained in this database have a history of mergers or acquisitions and to discover possible additional instances of bankruptcy, I consulted experts from the Italian biotech industry, various reports (Chiesa 2004: 14–20; Fornasiero 2004; Muffatto & Giardina 2003: 119), and the companies' web pages to identify those firms that had gone bankrupt or public, that had merged or been acquired.

Table 5 provides an overview of the information obtained and illustrates the extent to which British, German and Italian RPI strategists have changed their legal status – i.e. have

TABLE 5

Changes in the legal status of RPI strategists

Radical product innovators	UK		Germany		Italy	
	No.	%	No.	%	No.	%
In registration	1	0.8	0	0.0	0	0.0
Active investment	101	80.2	140	90.9	27	79.3
Went public	12	9.5	4	2.6	4	11.8
Acquisition	8	6.3	2	1.3	2	5.9
Merger	3	2.4	6	3.9	1	3.0
Bankruptcy	1	0.8	2	1.3	0	0.0
Σ	126	100.0	154	100.0	34	100.0
Successful RPIs[a]	114	90.5	144	93.5	31	91.1
Ambiguous RPIs[b]	11	8.7	8	5.2	3	8.9
Unsuccessful RPIs[c]	1	0.8	2	1.3	0	0.0
Σ	126	100.0	154	100.0	34	100.0
Legal status stability[d]	114	90.5	144	93.5	31	91.1
Legal status change[e]	12	9.5	10	6.5	3	8.9
Σ	126	100.0	154	100.0	34	100.0

Sources: VentureXpert, sampled on 19 October 2004: changes occurred between mid-1980s and 2004; Italian Biotech Database, sampled on 18 June 2006: changes occurred between mid-1990s and 2006.

Notes:

[a] Sum of biotech firms which were in the process of registration in 2004, which have remained unchanged since their establishment (active investment), or which went public between 1985 and 2004.

[b] Sum of biotech firms which merged or were acquired between 1985 and 2004.

[c] Biotech firms which went bankrupt between 1985 and 2004.

[d] See [a] above.

[e] Sum of biotech firms which merged, were acquired or went bankrupt between 1985 and 2004.

been in the process of registration (line 2), have remained unchanged (line 3), have gone public (line 4), have been acquired (line 5), have merged (line 6) or have gone bankrupt (line 7) – since the mid-1980s. While the upper part of Table 5 (lines 2 to 7) provides more detailed insights into corporate changes, the middle part (lines 9 to 11) regroups the respective events into successful, unsuccessful and ambiguous cases. The lower part (lines 13 to 14), in turn, proposes a dichotomous summary of the initial events (lines 2 to 7) by distinguishing merely between legal status stability (line 13) and legal status change (line 14). It should be noted that this sample presumably conveys an overly optimistic impression of strategy sustainability because it only includes those cases that constitute (potential) venture capital recipients. Having been subject to the scrutiny of venture capitalists, these firms are likely to be engaged in more promising research projects than the average biotech firm in Germany, Italy and the UK. Importantly, though, this bias towards RPI stability is symmetric so that actual failure can be assumed to be systematically higher in all three countries to the same extent.

The figures presented are telling in that they again cast doubt on the argument advanced in the national competitiveness literature that RPI strategies are unsustainable in Germany (see Casper 2007; Vitols 2001: 355–359). Contrary to this claim, Table 5 shows that the aggregate figures of legal status sustainability are strikingly similar for British (90.5 per cent), German (93.5 per cent) and Italian (91.1 per cent) RPI strategists alike. I tested the statistical robustness of this observation through several cross-tabular analyses. More precisely, and in line with the previous analyses, I tested the associational strength between the *country* of RPI strategists and their *sustainability*, whereby I measured the latter in terms of 'strategy success', 'ambiguity' and 'failure' on the one hand,[26] and in terms of 'legal status change' and 'legal status stability' on the other.[27] The results obtained show that the scores are not statistically significant for either chi-square or Cramer's V, with Cramer's V scoring low in addition. These indicators thus lend additional statistical support to the observation that RPI strategies are about equally sustainable in Germany, Italy and the UK.

Strategy Choice

Given that the second section showed that firms in different types of economies pursue RPI, DQP and LCP strategies to the same extent, and given that the previous analyses indicate that strategies are successful even if they are pursued in institutionally hostile environments, it can be ruled out that entrepreneurs base their strategy choice on institutional considerations. But what is it, then, that drives an entrepreneur's choice of competitive strategy? This section aims to provide an alternative explanation. To this end, it should be noted that *choice* and *change* of competitive strategies are synonymous events from an analytical point of view, as they are determined by the same cause. The use of one or the other term simply depends on a firm's stage of development. Whenever a company is set up from scratch, it has to choose the strategy it wishes to pursue. An established firm, by contrast, already pursues a strategy that it may wish to change at a certain point in time. Yet, the reasons why a newly founded firm chooses a particular strategy and an already established company changes its strategy are the same. In this section, I will discuss instances of strategy choice and change to roughly the same extent.

Drawing on insights I gained from interviewing CEOs and managers of selected RPI, DQP and LCP firms,[28] I suggest that entrepreneurs base their choice of competitive strategy

on technological opportunities, that is, on the inventions made by scientists and the facilities available for developing these inventions into marketable products. To illustrate this argument, I will discuss several particularly revealing cases, presenting them in three groups. The first group consists of three firms that resemble each other in all respects but three: the institutional environments in which they are situated, the technological opportunities available to them, and the strategies they pursue. The second group includes four firms that constitute prototypical examples of German and Italian biotech firms. Differing in a variety of ways, their common feature consists of the extent to which technological opportunities have influenced the firms' strategy choices. Finally, the third group is made up of three companies that have changed their strategy at a particular point in time. While the direction and moment of change as well as the firms' institutional environment differ, the most important driver of strategy change is the same in all three cases: technological opportunities.[29]

Similar Firms, Choice of Different Competitive Strategies

A particularly revealing example of how choice of competitive strategy is influenced by technological opportunities is provided by three biotech firms, which, for reasons of confidentiality, shall be called: *Chrome Ltd*, *Chrome GmbH* and *Chrome Srl*. These firms are strikingly similar in many respects. In addition to being active in the biotech industry, they are also active in the same therapeutic area of vaccines against bacterial pathologies. Although independent in their short- and medium-term decisions, all three firms are wholly owned by the same US corporation. Furthermore, they are similar in size, employing 750, 850 and 1100 people, respectively. All have a fully integrated value chain, which includes an R&D department, production facilities, marketing and sales structures, and administrative support functions. However, the three companies differ in two crucial aspects. First, they are situated in three different institutional environments: *Chrome Ltd* in the UK, *Chrome GmbH* in Germany and *Chrome Srl.* in Italy. Furthermore, they also differ in the competitive strategies they pursue. While the German and British firms are engaged in development-oriented DQP strategies, the Italian company specialises in research-oriented RPI (UkDQP1; ItRPI2; GerDQP2).

Since this strategic orientation runs counter to the expectations of the national competitiveness literature, I asked human resources managers from each firm about the reasons for their company's strategy choice. Interestingly, the three interviewees agreed in their answer: the choice or change of competitive strategy was motivated by the technological opportunities of each firm, namely, the extent to which pharmaceutical inventions gave rise to hopes for the development of radically or, respectively, incrementally new products. When the US holding company bought the Italian affiliate in 1992, the latter had a long-standing history in pharmaceutical research due to its extensive R&D facilities and its links to internationally renowned research institutes. These technological capacities had not only produced radically new pharmaceuticals, but also raised hopes for further radical innovations. Accordingly, the Italian affiliate continued to pursue a research-focused RPI strategy after its acquisition (ItRPI2). This was different for both the German and the British affiliate. When the two firms were bought by the US holding company, their R&D facilities as well as their academic networks promised incremental rather than radical innovations. Therefore, the German biotech firm continued to pursue a development-focused DQP strategy (GerDQP2), whereas its British counterpart changed from an RPI to a DQP pursuer (UkDQP1).

Different Firms, Choice of Similar Competitive Strategies

Further evidence of firms choosing their strategies on the basis of technological opportunities is provided by the emergence of the German and Italian biotech industry in general, and by two German and two Italian biotech firms in particular. To preserve their confidentiality, the German firms shall be called *Melareen AG* and *Intrapharma AG*, the Italian firms *Belle SpA* and *Neverpharma SpA*. These firms are not only examples of Germany's and Italy's most successful biotech firms in the early years of the new millennium, they are also particularly representative examples of the different circumstances under which the German and Italian biotech industry crystallised.

To begin with, the incentives to set up a biotech firm were diametrically opposed in Germany and Italy. While structural and financial support from the government provided positive incentives for company formation in Germany, the opposite was true for Italy, where biotech firms were often founded as a response to downsizing measures by pharmaceutical companies. Furthermore, like many German biotech firms, *Melareen* and *Intrapharma* were spin-offs from academic institutions (GerRPI1; GerRPI2), whereas *Belle* and *Neverpharma* grew out of incumbent pharmaceutical companies (ItRPI3; ItRPI1), as did almost all Italian biotech firms. Finally, company foundation took place at different points in time. While the two German firms are representative of many German biotech companies, as they were founded in the mid- and late 1990s, the two Italian firms represent most of their national counterparts in that they were set up around the turn of the millennium.

Despite these discrepancies, German and Italian biotech firms in general, and these four examples in particular, agreed in their choice of competitive strategy. Aiming at the commercial development of those radical inventions that were made within the organisation from which the firms in question developed, all newly founded companies decided to pursue RPI strategies (GerRPI1; GerRPI2; ItRPI3; ItRPI1). This decision was not affected by the extent to which national institutions provided the necessary input factors for RPI. Instead, the search for these factors came after the decision to establish an RPI company.

Strategy Change over Time

Three examples of strategy change complete the anecdotal evidence. A German LCP strategist, renamed here as *Aetherpharma GmbH*, constitutes the first example. Until 2001, *Aetherpharma* was part of a larger pharmaceutical group, within which it pursued a DQP strategy. When the increasing need for innovative performance and flexibility led to the splitting of this group *Aetherpharma* had to reconsider its strategic orientation. Following a prolonged period of reduced R&D efforts, *Aetherpharma*'s discovery record was bleak. Since its poor R&D performance dashed hopes for early inventions, *Aetherpharma* decided to change its competitive strategy from DQP to LCP (GerLCP1). This decision, in turn, demonstrates how technological opportunities and, more precisely, the prospect *not* to come up with marketable innovative products influenced the firm's decision to change its strategy.

A similar example is provided by an Italian LCP strategist, which, for reasons of confidentiality, is here referred to as *Glycerine SpA*. Until the early 1990s, *Glycerine* was a typical marketing specialist in that it imitated, produced, registered and marketed the products of other pharmaceutical firms. While pursuing these activities, *Glycerine* happened to discover a recombinant protein which raised hopes for the development of superior products and, hence, for incremental innovation. In an attempt to exploit this technological opportunity commercially, *Glycerine* opened a small research centre and changed from an

LCP to a DQP strategy. But this change in general, and pharmaceutical development in particular, was not without problems. While the R&D activities of *Glycerine* translated into several patents and international research collaborations, the firm became aware that it lacked both the financial means and the technological expertise to develop its discovery into a marketable product. Consequently, it decided to stop its R&D efforts and closed the research centre in the early twenty-first century (ItLCP1). In other words, *Glycerine* changed from a DQP back to an LCP strategy – roughly ten years after its first strategy change. Akin to the experience of *Aetherpharma*, the change from LCP to DQP, and vice versa, was caused by technological opportunities: namely, the firm's hope, then inability, to turn a pharmaceutical invention into a marketable product.

The final example of strategy change is again provided by an Italian firm, which I call *Allpharma SpA*. Unlike the two previous cases, *Allpharma* changes – and changes back – its competitive strategy from DQP to RPI. In essence, this is possible because the firm's R&D activities take place at two levels. Having been among the first Italian firms to open their own R&D laboratories, the national research facilities of *Allpharma* constitute the basis for the firm's usual activities in incremental product innovation. Furthermore, *Allpharma* is one of the founding members of a European research alliance: an exclusive, private and international research network established in 1989. Having the explicit aim of facilitating the 'joint research and development of innovative pharmaceutical products' (ItDQP1), this research network occasionally serves as a platform for the development of *Allpharma's* radical innovations. More concretely, *Allpharma* occasionally makes radical discoveries while pursuing its traditional DQP activities. Seizing these technological opportunities, the firm temporarily changes its strategy from DQP to RPI by relying extensively on its international research partners. Once the latter have helped to transform the radical invention into marketable patents, or even products, *Allpharma* changes back to incremental innovation and proceeds with product improvements (ItDQP1).

In sum, the fourth section shows technological opportunities to be of central concern to entrepreneurs when choosing their firm's strategy in two respects. First, the firms studied differ in all particulars but one: their strategy choice was driven by the prospect not to be inventive or, rather, to develop a radical or incremental invention into a marketable product. Second, all 'strategy changers' chose a new strategy that was technologically close to the former one. Firms switched from LCP to DQP strategies, and vice versa. They also changed back and forth from DQP to RPI strategies. However, not one firm switched from RPI to LCP – or the other way round. The decision to choose a new strategy that corresponds to the firm's former technological expertise underlines how important technological considerations are for the strategy choices of pharmaceutical firms.

Conclusions

What do the analyses of this paper teach us about the success and choice of competitive strategies pursued in the pharmaceutical industry? Contrary to the central argument of the national competitiveness literature,[30] entrepreneurs do not seem to base their choice of competitive strategy on institutional considerations. They do not necessarily choose to pursue that strategy which is facilitated by national institutions providing specific input factors, but decide to engage in RPI, DQP and LCP strategies irrespective of their firm's institutional environment (see the second section). Interestingly and, again, contrary to the

expectations of national competitiveness scholars,[31] entrepreneurs are not punished for pursuing strategies that receive no institutional support, as neither the success nor the sustainability of competitive strategies seems to be dependent on national institutions providing the required input factors (see the third section).

While alternative explanations for strategy success go beyond the scope of this paper, I have sought to develop an alternative explanation for strategy choice on the basis of qualitative evidence, in that systematic comparisons of interviews with CEOs and managers suggest that technological opportunities are a crucial factor whenever entrepreneurs decide which competitive strategy to pursue. More concretely, entrepreneurs have proven to opt for the pursuit of LCP strategies whenever the prospect of inventions is limited. But whenever chances of developing an incremental or radical invention into a marketable product are reasonable, they rather choose to pursue RPI or DQP strategies (see the fourth section).

These insights challenge contributions to the national competitiveness literature, which portray firms as institution-takers.[32] By arguing that firms choose their strategy in line with those national institutions that provide the necessary types of finance and labour qualifications, the literature attributes important constraining capacities to these financial and labour market institutions. This idea is underlined by the reasoning that firms which choose to pursue institutionally unsupported strategies are less successful and, thus, not sustainable over time.[33] The previous analyses have however shown that firms behave like Schumpeterian entrepreneurs rather than constrained institution-takers, which becomes apparent from the following reasoning. Schumpeter draws a crucial distinction between entrepreneurs and managers (Schumpeter 1934: 74–94; 1939: 103–106; 1947) in that, 'the defining characteristic [of the entrepreneur] is simply the doing of new things or the doing of things that are already being done in a new way (innovation). … [Thereby,] the 'new thing' need not be spectacular or of historic importance. It need not be Bessemer steel or the explosion motor. It can be the Deerfoot sausage' (Schumpeter 1947: 151). Contrary to this, a manager merely 'head[s] the administration of a going concern' (ibid.). Entrepreneurs thus possess the necessary creativity to pursue new business ideas and 'to cope with the resistances and difficulties which action always meets with outside of the ruts of established practice' (ibid.: 152). Managers lack that creative capacity.

While I used the notion of 'firms' throughout this paper as an umbrella term for 'managers' and 'entrepreneurs', Schumpeter's distinction indicates that firms gain competitiveness because they are 'entrepreneurial', not because they are 'managed' (Schumpeter 1934, 1939). We have seen that firms are competitive because entrepreneurs deliberately consider their firm's individual technological opportunities when choosing its competitive strategy. In the same vein, we have seen that entrepreneurs do not let their strategy choice be driven by the institutional environment of their company. This makes it possible to conclude that corporate competitiveness results from the independence and creativeness of entrepreneurs rather than the institution-driven implementation of strategies through managers.

Acknowledgements

I wish to thank Steven Casper, Colin Crouch, Guido Höllering, David Soskice, Rikard Stankiewicz, Wolfgang Streeck, Pieter Vanhuysse and Raymund Werle for stimulating

discussions and their comments on earlier versions of this paper. I am grateful to Fabio Pammolli for granting me access to the PHID database and to Laura Magazzini for assisting me in sampling it.

Notes

1 Proponents are in particular Porter (1990: 355-382), Pavitt and Patel (1999), Hollingsworth (2000), Estevez-Abe et al. (2001), Hall and Soskice (2001a: 36-44), Vitols (2001), Amable (2003), Casper and Matraves (2003), Casper and Whitley (2004), Sinn (2005); see also, Lindgaard Christensen (1992), Freeman (1992) and Keck (1993).

2 See, in particular, Porter (1990: 482–507), Pavitt and Patel (1999), Estevez-Abe et al. (2001), Hall and Soskice (2001a: 36–44), Vitols (2001), Amable (2003), Casper and Matraves (2003), Casper and Whitley (2004); see also, Lindgaard Christensen (1992), Freeman (1992), Walker (1993) and Hollingsworth (2000).

3 See Estevez-Abe et al. (2001: 175–176) and Amable (2003: in particular 102–114, 197–213); see also, Porter (1990: 421–453), Malerba (1993) and Trento (2005).

4 For proponents of this argument, see Hall and Soskice (2001a: 17–21), Vitols (2001: 355–359), Hall and Gingerich (2004) and Casper (2007).

5 See Porter (1980: Chapter 2; see also, Porter (1985: Chapter 1), Hall and Soskice (2001a: 14–17), Estevez-Abe et al. (2001: 148–149), Casper (2001: 397–401), Lundvall (1992a: 10), Heckscher (1919), Ohlin (1933: 7) and Sinn (2005: 18–19).

6 The generic term of a *pharmaceutical firm* is commonly used in the literature for any company that is active in the pharmaceutical industry. Accordingly, the firm is assigned to the industry on the basis of the *good* it produces: a pharmaceutical product. The distinction between a 'biotechnology', a 'traditional pharmaceutical' and a 'generics firm' refers to the *technological approach* of the pharmaceutical company in question. *Biotechnology firms* employ the most modern technology on the level of the cell and sub-cell to create industrially useful substances. *Traditional pharmaceutical firms* sometimes resort to biotechnological methods; they mostly use experimental and, thus, less deliberate approaches to drug design. Finally, *generics firms* are least technology intense as they do not engage in any research and clinical development activities but imitate drugs as soon as their patent protection expires (see Drews 2000; Muffatto & Giardina 2003; Orsenigo et al. 2001; Pammolli et al. 2002; Wittner 2003). Throughout this paper, I use these commonly acknowledged definitions of a pharmaceutical, a biotech, a traditional pharmaceutical and a generics firm.

7 The PHID database is constantly updated. All figures reported in the following refer to November 2004.

8 The PHID database identifies the nationality of a firm according to the location of the firm's headquarters.

9 To be precise, the PHID database covers 67 countries. However, the number of pharmaceutical projects registered in the remaining 60 countries is too limited to provide representative results.

10 Given that it takes on average 14 years to develop a pharmaceutical product (Muffatto & Giardina 2003: 108–109), I have limited the sample to the last 20 years in order to cover a sufficiently long time span, while eliminating outdated results.

11 Each of those nine, international pharmaceutical firms which were found to pursue – in two separate business units – an RPI strategy on the one hand and a DQP strategy on the other, are counted as two individual cases. For a more detailed illustration of the sampling approach underlying the results reported in Table 1, see Herrmann (2008; forthcoming: Chapter 2).

12 See Note 2.

13 See Note 1.

14 See Note 3.

15 See Note 4.

16 Namely, *CP Pharmaceuticals*, *Generics (UK)*, *Kent Pharmaceuticals*, *Sussex Pharmaceuticals*, *Tillomed Laboratories* and *Sterwin Medicines*.
17 Namely, *Aliud Pharma*, *Betapharm Arzneimittel*, *CT Arzneimittel*, *Hexal*, *Lichtenstein Pharmazeutica*, *Merck Dura*, *Ratiopharm*, *Azupharm* and *Stada Arzneimittel*.
18 Namely, *DOC Generici* and *Dorom*.
19 Namely, *DeveloGen*, *Ingenium Pharmaceuticals* and *Sirenade*.
20 Namely, *Axxam*, *BioXell*, *Newron Pharmaceuticals*, *Nikem Research*, *Novuspharma*, *Primm*, *Shar.dna* and *Siena Biotech*.
21 Based on these insights, I classified *DeveloGen*, *Ingenium Pharmaceuticals*, *Sirenade*, *BioXell*, *Newron Pharmaceuticals*, *Novuspharma*, *Shar.dna*, and *Siena Biotech* as RPIs, whereas I categorised *Axxam*, *Nikem Research*, and *Primm* as DQPs.
22 Detailed results of the crosstab analyses performed can be provided by the author upon request.
23 More concretely, the key indicators obtained are:

- For the UK: $\chi^2 = 2.140$ (four cells = 44.4% with expected count less than 5), $p > 0.10$; Cramer's V = 0.153, $p > 0.10$.
- For Germany: $\chi^2 = 6.314$ (six cells = 66.7% with expected count less than 5), $p > 0.10$; Cramer's V = 0.265, $p > 0.10$.
- For Italy: $\chi^2 = 4.988$ (six cells = 66.7% with expected count less than 5), $p > 0.10$; Cramer's V = 0.253, $p > 0.10$.

24 More concretely, the key indicators obtained are:

- For the UK: $\chi^2 = 0.468$ (one cell = 16.7% with expected count less than 5), $p > 0.10$; Cramer's V = 0.101, $p > 0.10$.
- For Germany: $\chi^2 = 3.706$ (three cells = 50.0% with expected count less than 5), $p > 0.10$; Cramer's V = 0.287, $p > 0.10$.
- For Italy: $\chi^2 = 3.866$ (three cells = 50.0% with expected count less than 5), $p > 0.10$; Cramer's V = 0.315, $p > 0.10$.

25 The majority of today's most successful biotech firms in Italy were founded between 1999 and 2003 (see Venture Valuation 2006).
26 The key indicators obtained are: $\chi^2 = 2.037$ (four cells = 44.4% with expected count less than 5), $p > 0.10$; Cramer's V = 0.057, $p > 0.10$.
27 The key indicators obtained are: $\chi^2 = 0.907$ (one cell = 16.7% with expected count less than 5), $p > 0.10$; Cramer's V = 0.054, $p > 0.10$.
28 For reasons of confidentiality, I refer to these interviews with two or three initial letters abbreviating the country in which the interview was carried out ('Ger' for Germany, 'It' for Italy and 'Uk' for the United Kingdom), combined with an abbreviation for the strategy pursued by the interviewee's firm and a figure indicating the number of the interview.
29 This section draws on interviews carried out between March 2004 and March 2006. Changes after March 2006 are not taken into consideration here.
30 See Notes 1 to 3.
31 See Note 4.
32 See, in particular, Porter (1990), Pavitt and Patel (1999), Hall and Soskice (2001b), Amable (2003), Hall and Gingerich (2004), Casper (2007) and Hancké et al. (2007).
33 See Note 4.

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APPENDIX

TABLE A1

RPI, DQP and LCP in the UK

Company name	Technology focus	Firm age	Competitive strategy
Acambis	Biotech	12	RPI
Amarin	Biotech	15	RPI
Antisoma	Biotech	16	RPI
CRT (Cancer Res Tech.)	Trad. Pharma	41	RPI
Celltech Group	Biotech	24	RPI
CeNeS	Biotech	7	RPI
Henderson Morley	Biotech	8	RPI
Imperial Cancer Res.	Trad. Pharma	102	RPI
KS Biomedix	Biotech	n.a.	RPI
Onyvax	Biotech	7	RPI
Pharmagene	Biotech	7	RPI
PowderJect	Biotech	11	RPI
Protherics	Biotech	5	RPI
Scotia	Biotech	20	RPI
SkyePharma	Biotech	8	RPI
Xenova	Biotech	17	RPI
AstraZeneca	Trad. Pharma	91	RPI & DQP
GlaxoSmithKline	Trad. Pharma	174	RPI & DQP
Shire	Trad. Pharma	18	RPI & DQP
Amersham Pharmacia Biotech	Trad. Pharma	n.a.	DQP
Axis Genetics	Biotech	n.a.	DQP
Bioglan	Biotech	72	DQP
Britannia	Trad. Pharma	23	DQP
British Biotech	Biotech	18	DQP
Cambridge Antibody Technology	Biotech	14	DQP
Crusade Laboratories	Biotech	5	DQP
DevCo	Trad. Pharma	5	DQP
Galen	Trad. Pharma	36	DQP
Napp	Trad. Pharma	81	DQP
Nycomed Amersham	Trad. Pharma	130	DQP
Oxford Glyco Sciences	Biotech	n.a.	DQP
Provalis	Biotech	7	DQP
Smith & Nephew	Trad. Pharma	73	DQP
Allergy Therapeutics	Trad. Pharma	70	LCP
Biopharm (UK)	Biotech	n.a.	LCP
Cambridge Lab.s	Trad. Pharma	17	LCP
Virogen	Biotech	n.a.	LCP

Source: PHID database (November 2004).

TABLE A2

RPI, DQP and LCP in Germany

Company name	Technology focus	Firm age	Competitive strategy
BASF	Trad. Pharma	139	RPI
Curacyte	Biotech	5	RPI
GPC Biotech	Biotech	7	RPI
Jerini Bio Tools	Biotech	10	RPI
MediGene	Biotech	10	RPI
Merz	Trad. Pharma	96	RPI
MorphoSys	Biotech	12	RPI
Scil Biomedicals	Biotech	5	RPI
Wilex Biotechnology	Biotech	7	RPI
ASTA Medica	Trad. Pharma	169	RPI & DQP
Bayer	Trad. Pharma	141	RPI & DQP
Boehringer Ingelheim	Trad. Pharma	119	RPI & DQP
Schering AG	Trad. Pharma	133	RPI & DQP
Altana	Trad. Pharma	27	DQP
Degussa	Trad. Pharma	5	DQP
Falk	Trad. Pharma	44	DQP
GLE Medicon	Trad. Pharma	n.a.	DQP
Gruenenthal	Trad. Pharma	58	DQP
Jenapharm	Trad. Pharma	54	DQP
Madaus	Trad. Pharma	85	DQP
Medac	Biotech	34	DQP
Merck KGaA	Trad. Pharma	336	DQP
Merckle	Trad. Pharma	59	DQP
Paion	Biotech	4	DQP
Revotar	Biotech	4	DQP
Schwarz Pharma	Trad. Pharma	58	DQP
Plantorgan	Trad. Pharma	30	LCP
Schwabe	Trad. Pharma	138	LCP
Strathmann	Trad. Pharma	30	LCP

Source: PHID database (November 2004)

TABLE A3
RPI, DQP and LCP in Italy

Company name	Technology focus	Firm age	Competitive strategy
Abiogen	Biotech	7	RPI
Alfa Wassermann	Trad. Pharma	56	RPI
Ausonia	not available	n.a.	RPI
Istituto di Ricerche Sigma Tau	Trad. Pharma	19	RPI
Medioloanum	Trad. Pharma	32	RPI
Poli	Trad. Pharma	25	RPI
Rotta Research	Biotech	43	RPI
SPA	Trad. Pharma	57	RPI
Bracco	Trad. Pharma	77	RPI & DQP
Menarini	Trad. Pharma	118	RPI & DQP
Fidia	Trad. Pharma	58	DQP
Bruno	Trad. Pharma	n.a.	DQP
Chiesi	Trad. Pharma	69	DQP
Dompe	Trad. Pharma	64	DQP
Eurand	Trad. Pharma	35	DQP
Geymonat	Trad. Pharma	76	DQP
Italpharmaco	Trad. Pharma	66	DQP
Recordati	Trad. Pharma	78	DQP
Zambon	Trad. Pharma	98	DQP
Biotoscana	Biotech	n.a.	LCP
Formenti	Trad. Pharma	50	LCP
Guidotti	Trad. Pharma	90	LCP
Lusopharmaco	Trad. Pharma	53	LCP
Mipharm	Trad. Pharma	6	LCP
Neopharmed	Trad. Pharma	n.a.	LCP
Rottapharm	Trad. Pharma	43	LCP
Segix	Trad. Pharma	42	LCP

Source: PHID database (November 2004)