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## Entrepreneurial social capital and reciprocal dependence effects on strategy: an empirical study of CROs in China

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**Abstract:** Entrepreneurs must solve the problems related to localisation of information and knowledge relevant to opportunities, uncertainty reduction and incentive misalignment. This is even more important when dealing with large firms, in situations of high uncertainty and large stakes. Using survey data on CROs in China, we found that for entrepreneurial technology firms dealing with powerful partners, the entrepreneur's social capital (relational capital, network ties and cognitive similarity) and his management of internal cohesiveness have a significant bearing on strategy, knowledge exchange and overall performance. The effects are moderated by the reciprocal dependence with the partners. These findings contribute to a better understanding of the entrepreneurial process in unusually uncertain, high-stakes situations.

**Keywords:** entrepreneur; high stakes; reciprocal dependence; social capital; uncertainty; internal cohesiveness.

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## **1 Introduction**

Entrepreneurial firms, especially technology-based ones, often achieve survival and growth through special exchange arrangements with large firms. For example, contract research organisations (CROs) are involved in cooperative product development and innovation with large pharmaceutical firms (Piachaud, 2002). The importance to large firms of these relationships can become substantial and the stakes involved may generate anxiety among managers. For entrepreneurial firms, these relationships bring resources and opportunities, but could also generate greater vulnerability and uncertainty (Alvarez and Barney, 2001; Anderson and Jap, 2005; Yang et al., 2014). This situation is fairly common in high technology developments and, as we shall see, firm strategic behaviour is pulled apart by conflicting needs.

Research has shown that top managers' relationships and their entrepreneurial behaviour are critical resources. In particular, their social network quality and ability to strengthen internal cohesiveness are significant determinants of performance (Alvarez and Busenitz, 2001). More specifically, researchers highlight the effect of entrepreneurs' social capital on firms' growth (Bratkovic et al., 2009). The entrepreneur's social capital is also related to the firm's ability to respond consistently to the partners' demands, thus also to cohesiveness and cooperation among the firm's key employees. Finally, context influences the relationships between young/small firms and their dominant partners (Fischer and Reuber, 2004) and may moderate the relationship.

Although entrepreneurs' social capital and its effect on performance are widely studied, extending it to internal cohesiveness and taking into account context has not been attempted. This leaves a research gap addressed in this paper. We report in particular on the results of a research into the relationship between entrepreneurs' social capital and internal management of cohesiveness, on the one hand and on the other hand their firms' strategic choices and performance, in the context of technological exchange with large firms. In these situations, stakes and uncertainties are generally seen as significant by both parties and reciprocal dependence, a description of the relative powers of the parties, is likely to moderate the effects. The empirical work is carried out in the context of CRO business in China. CROs are usually entrepreneurial technology firms providing professional services to large pharmaceutical firms. While both parties need to be highly involved in the interactions to achieve knowledge development, innovation and efficiency, they are exposed to great uncertainties, both about outcomes and process. Because problems in the relationship may be devastating to the parties, the stakes are high. This is an unusual situation and a favourable context to address questions about how to achieve success in such situations.

Our findings are that outcomes, in particular entrepreneurial firm's strategies, knowledge flows among the parties and overall performance, are determined by the entrepreneur's social capital, in particular his/her relational capital, his/her network ties and his/her cognitive similarities relative to other key stakeholders. This is reinforced by

internal cohesiveness, a result of values and incentives provided to key personnel. The relation is significantly moderated by reciprocal dependence.

The rest of the paper is structured as follows. In the next section, we conduct related literature review and provide a theoretical model to introduce the research hypotheses. The third section deals with data and methods and in the fourth section we describe the results of this research. The last two sections provide a discussion and a few concluding comments.

## **2 Research model**

### *2.1 Entrepreneurial technology firms' relationships with large firms*

Usually large firms have strong motives to deal with entrepreneurial firms, in particular technology-based ones. The cost of technology development in large and highly formalised settings is much higher than it is for smaller more nimble CROs. For the latter, this means also dependency on large firms, in return for predictable financial revenues and sometimes information, technology and industrial reputations (Stuart et al., 1999), which could be seen as an acceptable trade-off. But dependency on large firms could also mean increased uncertainty. Sometimes there is mutual dependency, as when knowledge is precarious and controlled on both sides. In such a case, uncertainty and anxiety could increase for both sides. According to resource dependence theory, "organizations are... in a constant struggle for autonomy and discretion" [Pfeffer and Salancik, (1978), p.257]. Entrepreneurial firms, especially technology-based ones, have to struggle to deal with the uncertainty that comes from their large client firms. Facing liabilities of newness, related to youth and small size, they are more constrained as suggested by population ecology (Hannan and Freeman, 1984). In particular, it takes time to secure trusting relationships. Such a situation heightens vulnerability to environmental instability, scarcity and complexity (Rasheed and Prescott, 1992; Thompson, 1967).

Even when trusting relationships are established, entrepreneurial firms often have to meet the cost-cutting challenges from large firms. As the latter outsource business to entrepreneurial firms, they generally benchmark with their own expectations and internal operation standards, which could pressure entrepreneurial firms and test their ability to function with less resources (Azoulay et al., 2010). Besides cost-cutting pressures, without their own distinctive technology, entrepreneurial firms are often in weak negotiating positions (Alvarez and Barney, 2001; Mirowski and van Horn, 2005).

Dependency is even more unnerving where competition is strong for customers and contributors. Entrepreneurial technology firms sometimes compete for high-ticket contracts, which have been described elsewhere as particularly uncertain and the source of multiple dangers. Building relations so that one can secure contract renewal is critical for survival. In contrast, securing these contracts through competitive bidding is unlikely to generate a lasting business.

Uncertainty, in these high stakes technology relations, is related to resource availability or access. It is manifest in three areas of activities:

- 1 business contract renewal
- 2 research conduct and outcomes
- 3 future business development.

To meet all these challenges, the entrepreneurs' roles are crucial for small technology firms.

In dealing with fundamental uncertainty<sup>1</sup>, social processes are often more effective than material incentives (Sorenson and Stuart, 2008). They are intended to generate legitimacy and trust. But how trust is generated is unclear. The entrepreneur's interpersonal relationships and management of internal cohesiveness may be the key, even if the relation between interpersonal and inter-organisational trust is unclear (Zaheer et al., 1998). Individually generated trust is not necessarily transferred to organisations, except when individuals and their organisations are the same in the eyes of the actors involved. This is precisely the case for young entrepreneurial technology firms, where the founding entrepreneur dominates both strategy and operations. Thus we expect the entrepreneur's social capital and internal management of key people to determine firm strategy, mutual trust and ultimately firm performance, which leads to our theoretical hypotheses development as below.

## *2.2 Entrepreneurs' social capital*

Social capital is always a fundamental resource for entrepreneurs and plays key roles in entrepreneurship (Gedajlovic et al., 2013). To solve the problems related to uncertainty, entrepreneurs can make use of their social capital. The entrepreneur's effectiveness is a function of his/her ability to spot opportunities and build a lasting organisation to benefit from them (Shane and Venkataraman, 2000). Entrepreneurs are generally "individuals – either on their own or inside organizations –who pursue opportunities without regard to the resources that they currently control" [Stevenson and Jarillo, (1990), p.23]. From a sociological perspective, Sorenson and Stuart (2008) argue that there are three basic 'market failures' to which entrepreneurial activities are a response: "the localization of information, the presence of fundamental uncertainty and the misalignment of incentives between transacting parties" (p.526).

The dispersed pieces of information and data that may lead to an opportunity are available through relationships (Podolny, 2001), which emphasises entrepreneurs' social capital influence on performance (Batjargal, 2003). Only those entrepreneurs, who remain connected, because of a fruitful history of personal relations, can recognise and exploit opportunities. Social capital is here captured using three dimensions: relational capital, network ties and cognitive similarities (Nahapiet and Ghoshal, 1998). The latter are about cognitive orientations (in particular related to the effects of education and professional culture) that are similar to those of stakeholders controlling crucial resources. Most of the time, favourable relational capital, network ties and cognitive similarities come from previous professional experiences and reputation (Burt, 2004; Sorenson and Baum, 2003). In addition, many entrepreneurs' past education and working experience could help them to span boundaries and benefit from it (Almeida and Kogut, 1999; Saxenian, 1994). Finally, key people at entrepreneurial firms could also have been boundary-spanners, which brought with them precious data and information. Hansen (1999) suggested that the diffusion of information through a network may be more

suitable to "thin" information, while the acquisition of boundary-spanners may be the occasion to acquire complex and tacit knowledge. In entrepreneurial technology firms, both of these are mediated by entrepreneurs' social capital.

Fundamental uncertainty affects considerably the relationship between entrepreneurial technology firms and their large partners, both upstream in the production chain (customers) or downstream (e.g., university resource providers and government regulators). Sociological studies show that "Endorsements can play an important role when young firms, investors, potential employees, customers or suppliers have (often mutual) questions about the quality of the partners with whom they might interact" [Sorenson and Stuart, (2008), p.531]. As suggested by Light and Dana (2013), endorsement is also cultural. Endorsement, for young and untried organisations, comes as a result of the entrepreneur's relations, network ties and general acquaintances (Carroll and Hannan, 2000). This is particularly the case in the Chinese culture, in which Guanxi is critical for success (Xin and Pearce, 1996). Most of the time, entrepreneurial technology firms' strategies are built on such resources and result in two critical outcomes: *knowledge acquisition through exchange and overall financial performance*, which are here our main dependent variables.

Finally, alignment of incentives is related to the nature of contractual arrangements between entrepreneurial firms and their stakeholders. Given the weakness of legal controls or the difficulty of getting reasonable enforcements, many customers and suppliers of resources rely on social structures as substitutes (Sorenson and Stuart, 2008). These lead us to the following hypotheses:

- H1 Social capital of entrepreneurs determines entrepreneurial technology firms' strategy, knowledge exchange with stakeholders and their overall performance.
- H1A The higher the relational capital of entrepreneurs, the higher the exchange of knowledge with stakeholders and the higher the overall performance of entrepreneurial technology firms.
- H1B The wider the network ties of entrepreneurs with stakeholder representatives, the higher the exchange of knowledge with them and the higher the overall performance of entrepreneurial technology firms.
- H1C The higher the cognitive similarities between entrepreneurs and stakeholder representatives, the higher the exchange of knowledge with them and the higher the overall performance of entrepreneurial technology firms.

### 2.3 Internal cohesiveness

When entrepreneurs can utilise social capital to shape firm development, their management of internal cohesiveness is also critical for success. To exploit market opportunities with large firms under conditions of uncertainty, entrepreneurs must pay attention to external management but also to internal cohesiveness (Alvarez and Barney, 2005). The internal management of key people's cooperation, in particular values shared and incentives used, help to 'walk the talk' when relating to clients and partners. First, information and knowledge leading to identify and exploit opportunities may come from various quarters. Key people could contribute to information and knowledge-seeking

through their own relational capability. Second, the uncertainty, whether business or institutions-related, can be affected, reduced or increased, by the behaviour of key personnel. Professional organising, shown through employees' behaviour, should improve the confidence of stakeholders (Zott and Huy, 2007). Attention to the sources of uncertainty could feed the entrepreneur with signals that may prove particularly useful.

Key employees' ability to present a coherent picture to outside stakeholders, perhaps even the extent of their web-based social network (Sorensen and Stuart, 2008) could improve or harm the entrepreneurs' relational capital. It may also enhance or harm the extent and strength of their network ties. How key people are managed, the values that constitute the entrepreneurial culture and work climate and the incentives that are used to stimulate key people's cooperation, all contribute to internal cohesiveness and thus to the success or failure of the entrepreneurial technology firm-client relationships. Therefore:

- H2 Internal cohesiveness determines entrepreneurial technology firms' strategy, knowledge exchange and their overall performance.
- H2A Values-related cohesiveness of key people affects entrepreneurial technology firms' strategy, the exchange of knowledge with stakeholders and their overall performance.
- H2B Incentives-related cohesiveness affects entrepreneurial technology firms' strategy, the exchange of knowledge with stakeholders and their overall performance.

#### *2.4 Reciprocal dependence*

Finally, as stated earlier when addressing incentive alignment, on the supplier side and on the customer side, there is often 'closure' in the relationships among parties (Coleman, 1990), meaning that entrepreneurial firms' stakeholders can monitor the contract between the parties. They "have social connections to each other... (and) can provide proxy eyes and ears for the contract holders" [Sorenson and Stuart, (2008), p.536]. Kollock (1994) has shown that familiarity biases the relationships in favour of people we know better. As a result, customers' representatives are more comfortable with entrepreneurs with whom they share experience or previous education. Social relations can also generate trust or simply comfort that makes the business relation easier (Raub and Weesie, 1990; Robinson and Stuart, 2007). In dealing with entrepreneurial firms, large client firms can also use increasing commitments or mutual dependence as a form of social structure which makes relationships more secure. However, the extent and depth of reciprocal dependence may change the effects of social capital and of internal cohesiveness. According to Thompson (1967, pp.30–31) "dependence can be seen as the obverse of power. Thus an organization has power, relative to an element of its task environment, to the extent that the organization has capacity to satisfy needs of that element and to the extent that the organization monopolizes that capacity". Dependence of large firms on smaller ones is 'unacceptable', "subject to the nature of the interdependence, the organizations may resort to contracting, coopting, or coalescing" [Thompson, (1967), p.38]. In situations where stakes are high, save for taking control through coalescing, trust is necessary for contracting and coopting. Light and Dana (2013) indicate that the

effect of social capital may itself be moderated or mediated by culture. Here, the culture of dependence dominates relationships. Therefore, we expect that the more reciprocally dependent the partners are, the more potent is the effect of social capital. Also, as mutual dependence increases, partners are sensitive to all signals and in particular large firms are sensitive to the behaviour of key people in entrepreneurial technology firms, which brings to the fore their internal cohesiveness. We want to test such a moderating effect on the social capital and key people management dimensions:

- H3 Reciprocal dependence between entrepreneurial firms and large firms has a moderating effect on the relationships described in H1 and H2.

### 3 Methods

#### 3.1 CRO business as context

CROs are new entrepreneurial research-focused organisations, which provide crucial research activities and services in the pharmaceutical value chain (Mirowski and van Horn, 2005). These activities have recently been externalised by large pharmaceutical firms (pharmas) to reduce cost and increase effectiveness (Azoulay, 2004). Active in particular in China, because of the rising importance of the Chinese market and firms' research capabilities, they provide at a fraction of the traditional cost:

- 1 research to discover and generate new drugs
- 2 research to test already developed products (drugs)
- 3 the services required to get drugs approved by Chinese government regulators and marketed in the local market.

The scope of CRO business is much larger than just clinical trial, which is the traditional scope of CROs in western countries.

In contracting with CROs, pharmas are concerned about protecting their innovation property resources (Varlan and Le Paillier, 1999); yet, CROs are generally entrepreneurial firms, fairly unstable and susceptible of knowledge leaks. Language and cultural differences increase both parties' anxieties. For pharmas, contracting with CROs is seen as an adventure with high risks and opportunities (Harrill et al., 1999; Rainville, 2002).

For CROs and their founders stakes are high too and so is fundamental uncertainty. Securing pharmas' contracts is difficult, but essential. When they succeed, knowledge flows go hand in hand with profits and lead to lasting success. Winning pharmas' trust is also correlated with better access to local research talents and government regulators' respect. Moreover, relationships with powerful multinationals or important local clients may improve the chances of attracting venture investment.

In general, CRO business in China is a unique setting that puts entrepreneurial firms to the test of large firms' demands and provides one of the most appropriate contexts for us to test our hypotheses.

### 3.2 *Sample*

We used questionnaires to survey CROs operating in China. The CROs emerged in the last decade as a new business in the Chinese pharmaceutical sector. This was largely seen as an outcome of the 1998 new regulation requiring pharmaceutical companies to provide scientific experiment and clinical trial evidence to support their application for a new medicine registry. First local, then foreign pharmaceutical companies sought external help to meet the new regulation, providing an opportunity for the establishment of CRO businesses. Beginning with clinical trial services, pre-clinical experiments were provided to local pharmaceutical companies that were short of qualified R&D capabilities. Later, foreign pharma specifications were met and the latter's clinical research was off-shored to China (Cooper, 2008; Hamdouch and He, 2009). Some foreign CRO companies established their own Chinese affiliates and some immigrant Chinese pharmaceutical experts who had education and working experiences in Western countries went back to China and opened their CRO ventures.

CROs are both local and foreign firms and attract the whole range of drug research orders, from the early drug discovery to marketing design and planning. The business is in constant flux. The new series of 2006 and 2007 drug approval guidelines of the state food and drug administration (SFDA) eliminated many small CROs that did not have experiment or clinical trial capabilities. In addition, M&A decreased the number of CROs further. In 2010, it was estimated that in total there were less than 200 CROs in China.

This small CRO population is scattered across China. Furthermore, there is no formal catalogue of CROs and government records are imprecise. Moreover, we needed to survey the CRO entrepreneurs rather than managers. These limitations required creative access procedures to gather information and data (Dana and Dana, 2005). First, with help from *China Pharmtech Transfer Center*, the better known pharmaceutical association, we were introduced in person to 24 CROs' founders. Questionnaires were distributed and collected face to face. Second, another set of questionnaires was distributed at an annual CRO industrial meeting organised by *China Pharmtech Transfer Center*. 80 questionnaires were distributed and 59 questionnaires were collected. Finally, one participation was obtained through e-mail.

In so doing, we could increase participation and ensure that informants were really from actual operating CRO businesses. The procedure also ensures access to real CRO entrepreneurs. In total, we collected 84 questionnaires, but excluding incompletely filled ones, 60 valid questionnaires were used in the study. This is a convenient sample, but since the total number of CROs in China is small, we are confident that our findings are representative of what's happening in the industry.

In the final sample 67.3% CROs were local, both private or state-controlled firms and 47.4% were established after 2000. The average employee number is 178, implying that most CROs are middle or small sized firms. On average, each CRO has about 15 employees who have PhD degree, which is much higher than the ordinary Chinese firms and reflects the technology-intensive nature of CRO business. These CROs have about 49 clients on average. Table 1 provides a description of the sample.



**Table 1** Description of sample CROs

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>S. D</i>
Employee number	10	950	177.230	238.77
PhD staff number	1	200	15.36	29.77
Experiment business (%)	.00	100	52.53	38.24
Clinical business (%)	.00	100	26.99	34.91
Overseas business (%)	.00	100	26.04	33.08
Number of clients	3	370	48.98	80.81

### 3.3 Measurement development

The questionnaire was designed by combining knowledge acquired through past literature with results from a preliminary field work conducted during 2009. The early questionnaire was tested on a group of six CRO entrepreneurs and adjusted to ensure better understanding. It was initially written in Chinese, then translated into English for discussion by the authors, then back translated into Chinese as is customary (Brislin, 1970). In the questionnaire all the items were measured using a seven-point Likert-type scale. Then the items were analysed through factor analysis with varimax rotation. The Bartlett test of all the factor analyses is significant and the Kaiser-Meyer-Olkin also confirms the appropriateness of the factor model. The scale reliability was confirmed by computing the Cronbach alphas. Details are provided in the following section.

### 3.4 Dependent variables

In this research, we test the extent to which the entrepreneur's social capital and cohesiveness of key personnel influence strategic outcomes. Among the outcomes to be explained, we have chosen *strategy* as it is important for long term success (Andrews, 1987). Also, in this business, according to a preliminary round of interviews, *knowledge exchange* was considered essential for ultimate success and is also a dependent variable. Finally, the third variable explained is *overall performance* of the firm (finance, growth and competitive position), a critical measure of short term and long term survival.

To assess the strategy of CROs we used items describing CROs' most popular strategic actions as revealed in a preliminary case-based research. These items generated two constructs through factor analysis, which correspond to the characteristics of the main strategies described by Porter (1980)<sup>2</sup>:

- 1 *cost-leader strategy*
- 2 *differentiation strategy*.

*Knowledge exchange* was measured by items used in past studies (Kale et al., 2000; Muthusamy and White, 2005). These items are related to joint action, know-how and skill exchange, new capability acquisition and new idea generation. Perceptions of *overall performance* were assessed using items from Wu and Leung (2005). Respondents were asked to assess their company's performance, within the past three years, in service quality, service scope, technological progress, return on investment (ROI), business

growth and overall. The factor analyses for the dependent variables are summarised in Table 2.

**Table 2** Factor analysis for the dependent variables

	<i>Measure items</i>	<i>Factor loading (Cronbach's <math>\alpha</math>)*</i>
Differentiation	Our strategy is to serve all pharmas.	.549
	Our company emphasises the efficiency of our operations.	.799
	Our strategy is to be the provider of the best quality research.	.844
	Our company always uses the most advanced technology and equipment in providing our services.	.578
	Our strategy is to provide the best guarantee to our clients.	.788
		(.739)*
Cost-leadership	Our company emphasises the cost advantage of our company.	.920
	We make every effort to control the internal operation cost.	.890
		(.815)*
Knowledge exchange	Our company has learned to jointly execute marketing, R&D, or production operations with our client companies.	.780
	Our company has learned to exchange skills, know-how, or technologies with our client companies.	.797
	Our company has gained new techniques, competencies or technologies in working with our client companies.	.845
	Our company has developed new ideas or skills because of the interaction with our client companies.	.817
		(.817)*
Overall performance	Our company is satisfied with its past three years' business performance.	.872
	Our company is satisfied with the quality of its services in the last three years.	.815
	Our company is satisfied with the range of services provided in the last three years.	.766
	Our technological progress in the last three years has been important.	.569
	Our company is satisfied with its past three years' ROI.	.870
	Our financial results have significantly improved in the last three years.	.855
	Our company is satisfied with its past three years' business growth.	.869
		(.909)*

### 3.5 Independent variables

We used two sets of independent variables: *social capital* and *internal cohesiveness*. The measurement of entrepreneurs' *social capital* is divided into three dimensions: *relational capital*, *network ties* and *cognitive similarities*, as suggested by Nahapiet and Ghoshal (1998). The items used to assess *relational capital* were borrowed from Kale et al. (2000) and cover the extent to which respondents agree with the description of their relational capital with client companies. The items about *network ties* refer to a protocol from Peng and Luo (2000) and describe "the extent to which you (or your entrepreneurial team) have utilized personal networks and connections during the past three years" (p.501). *Cognitive similarities* measures factors that produce similar cognition, including the same education background, work experiences, generation, hometown geography and family background. It is measured by the extent to which there are similarities between entrepreneur (and entrepreneurial team) of respondent firms and key managers/officials of partner organisations. These items are supposed to capture the essence of social capital and, short of a precise assessment of the extent of each top manager's network ties, were retained as reasonable proxies of the effectiveness of their actual networks. The final factor analyses for all three dimensions of social capital are shown in Table 3.

**Table 3** Factor analysis of social capital

<i>Measure items</i>		<i>Factor loading (Cronbach's <math>\alpha</math>)*</i>
Relational capital	There is mutual respect between me (and our entrepreneurial team) and senior managers of our client companies.	.922
	There is mutual trust between me (and our entrepreneurial team) and senior managers of our client companies.	.938
		(.860)*
Network ties	With senior managers at other CROs.	.819
	With professors and experts in universities, institutes, or hospitals.	.785
	With Government officials in drug bureau.	.705
	With senior managers of client companies	.782
		(.789)*
Cognitive similarities	With senior managers of client companies.	.589
	With senior managers of cooperating CROs	.751
	With professor and researchers of cooperating institutes.	.862
	With key persons of related government department	.711
		(.756)*

*Internal cohesiveness* is measured by items derived from sociology-based leadership studies (Selznick, 1957; Friedkin and Slater, 1994). Respondents were asked to evaluate the extent to which they agreed with the item descriptions. Two factors were extracted from varimax rotation: *values cohesiveness* and *incentive cohesiveness*, which is consistent with Glynn and Raffaelli's (2010) summary. The first factor is about how the entrepreneur's actions have increased the mindset cohesiveness among key personnel. The second factor is about how appropriate the incentives have been with regards to key

people motivation. The final factor analyses used in the regression analyses are reported in Table 4.

**Table 4** Factor analysis of internal cohesiveness

<i>Measure items</i>		<i>Factor loading (Cronbach's <math>\alpha</math>)*</i>
Value cohesiveness	In this organisation, key people have similar understanding of the business.	.795
	In this organisation, key people have similar training.	.754
	We have values of reciprocity.	.786
	Key people value business success.	.859
		(.830)*
Incentive cohesiveness	In this organisation, key people have had similar professional experiences.	.735
	In this organisation, key people have worked together in other organisations.	.678
	Key people are treated fairly in this organisation.	.852
	Key people have values of mutual support.	.696
		(.754)*

### 3.6 Moderator

The actions of CRO managers are also related to the context within which the business takes place, in particular the nature and structure of their relationships with clients. As argued earlier, mutual interdependence is important. Some of it is sequential dependence (CRO is dependent on client's decisions, then client is dependent on CRO delivery) and its effect can be assessed by the parties. Some of it is reciprocal as each of the actor's decision is related to input from the other (Thompson, 1967). This is a structural variable. It does not have a direct effect on performance. However, it influences the effectiveness of entrepreneurs' social capital and cohesiveness. Consistent with previous studies (Gulati and Singh, 1998; Krishnan et al., 2006), inter-organisational *reciprocal dependence* is measured by assessing the extent to which the partners are subject to three main situations: sharing complementary technology, joint development of technology and collaboration toward reduction of time needed for innovation. The factor analysis of reciprocal dependence is provided in Table 5. The factors are then introduced in the regression analyses.

**Table 5** Factor analysis of reciprocal dependence

<i>Measure items</i>		<i>Factor loading (Cronbach's <math>\alpha</math>)*</i>
Reciprocal dependence	We share complementary technology with each other.	.832
	We work jointly to develop technology (and knowledge).	.875
	We work together to reduce the time needed for innovation.	.782
		(.774)*

**Table 6** Means, standard deviation and correlations

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
1 Ownership	.327	.487											
2 Employee number (log)	4.438	1.217	.224										
3 Relational capital	6.254	1.005	.197	-.314*									
4 Network ties	4.987	1.372	-.353**	-.123	-.104								
5 Cognitive similarities	3.235	.791	.085	.251 <sup>†</sup>	-.098	.326*							
6 Value cohesiveness	6.031	.988	.179	-.098	.365**	.003	-.061						
7 Incentive cohesiveness	5.125	1.178	.201	-.306*	.413**	-.134	-.080	.436**					
8 Reciprocal dependence	5.770	1.045	-.128	-.099	-.134	.177	-.071	.265 <sup>†</sup>	-.010				
9 Differentiation strategy	5.769	.946	.223	-.292*	.662***	-.063	-.043	.410**	.386**	.056			
10 Cost-leader strategy	5.872	1.048	.069	.001	-.008	.165	-.224 <sup>†</sup>	.229 <sup>†</sup>	.046	.367**	.255 <sup>†</sup>		
11 Knowledge exchange	5.637	1.036	-.124	-.308*	.206	.187	-.078	.329*	.214	.426**	.502**	.263**	
12 Overall performance	5.525	1.016	.087	-.195	.358**	.177	-.052	.321*	.185	.215	.537**	.120	.619**

Notes: <sup>†</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

### 3.7 Control variables

We have two control variables in our analysis: *ownership* and *size*. Both have been shown in previous research to affect firms' performance. First, *ownership* is a dummy variable based on the ownership background of the firm. Whether the firm is local or foreign has a significant effect. Foreign firms are usually subsidiaries of MNCs, while local firms are controlled or significantly influenced by the state. In such a case, ownership may affect significantly the strategic behaviour and overall performance of the CRO (Sur, 2009). Since the background of investors not only represents property control but could also affect executives' social capital and management practices (Steensma and Lyles, 2000), it is necessary to control the effect of ownership in analysis. It is coded '0', for local companies and '1' for foreign companies.

Considering the generally short history of CROs in China, we choose size as a more appropriate control variable than age. Size has been shown to affect performance. Larger firms have economies of scale and strategic presence that may affect strategy and overall performance (Buzzell and Gale, 1987). Size is usually measured using assets or turnover, but in these technology intensive firms, it is better represented by *number of employees*. We took the log-transformed value of such a measure because the distribution departed from normality.

## 4 Findings

We hypothesised that social capital (relational capital, network ties and cognitive similarities) and internal cohesiveness of key people affected CRO strategy and performance, in their relationship with large pharmaceutical companies. Further, we proposed that the relationship was moderated by reciprocal interdependence. To test these assumptions, we used both correlation and regression analyses. Table 6 shows the means, standard deviations and correlations for all variables.

### 4.1 Correlations

Correlation Table 6 shows interesting relations:

- 1 Ownership is negatively correlated to network ties, which is not a surprise, as foreign firms' managers may be less inclined or able to develop networks of friends and social affiliates, justifying that foreign CRO entrepreneurs networking in China is not common or legitimate.
- 2 Size is negatively related to differentiation strategy and knowledge exchange, which suggests that, contrary to what we see in traditional businesses, larger CRO size is inconsistent with this type of business. There is a negative correlation between employee number and relational capital. The larger the CRO, the less the entrepreneur is able to develop social capital and use it as a basis for strategy and performance. Employee number is also negatively related to key people incentives. In general, this suggests that size is incompatible with differentiation, the use of social capital, incentives to key people and with knowledge exchange. *Larger CRO firms may discourage anything that is not structural and rules-based.* This seems to

describe pharma's subsidiaries that use Chinese labour to do work for parent organisations without any relations to others.

- 3 Among the dimensions of social capital, there is some correlation between network ties and cognitive similarities, probably because networks are generally based on previous training and experiences. Relational capital is related to internal values, to incentives and strongly to differentiation. This suggests that entrepreneurs with large relational capital are also keen on shared internal values and on appropriate incentives for key people. They choose mostly a differentiation strategy.
- 4 Reciprocal dependence is significantly correlated with value cohesiveness of key people, justifying our investigation into an interaction effect.

#### 4.2 *Regression analyses*

Because of the correlation between social capital variables and internal cohesiveness variables, we conducted two separate regressions, entering entrepreneur social capital variables and reciprocal dependence in the first regression and internal cohesiveness variables and reciprocal dependence into another. An assessment of multi-collinearity was conducted by examining variance inflation factors (VIF). The VIFs are much less than the ten cut-off value (Neter et al., 1985), showing no risks of multi-collinearity. These are reported in Tables 7 and 8. We conducted also a regression with all the variables together, which did not yield any significant new conclusions. The findings are:

- 1 Table 7 shows that H1 was partially supported.
  - a H1A is confirmed. Relational capital is positively related to knowledge exchange and overall performance. There are also some subtle effects that could deserve more attention. For example, relational capital is positively related to differentiation and marginally to cost-leadership.
  - b H1B and H1C are partially confirmed, as network ties and cognitive similarities affect strategy but not knowledge exchange and overall performance.
- 2 In Table 8 we see that H2 was also partially confirmed.
  - a In particular H2A is supported as value cohesiveness of key people is positively related to strategy, knowledge exchange and overall performance
  - b H2B is partially and marginally supported, while H2C is not supported. Incentive cohesiveness of key people is only related to differentiation strategy at the .10 level, implying H2b is only marginally accepted.
- 3 H3 is partially confirmed.
  - a Both Table 7 and 8 show the significant moderator effect of reciprocal dependence. Reciprocal dependence interacts with relational capital to discourage cost-based strategies and to improve overall performance.
  - b However, there are no significant interactions of reciprocal dependence with network ties and cognitive similarities. The interaction has no effect on knowledge exchange.

- c Also, value cohesiveness of key people is negatively moderated by reciprocal dependence to explain overall performance and knowledge exchange. The effect is opposite to that on relational capital, which comes as a surprise. It is possible that reciprocal dependence introduces a higher level of anxiety and more attention to protecting one's identity, which reduces the positive effect of trust and its enforcement through shared values.

## **5 Discussion and conceptualisation**

Successful entrepreneurs are able to resolve the problems related to localisation, fundamental uncertainty and incentives misalignment (Sorenson and Stuart, 2008). The initial relational capability of an entrepreneur or entrepreneurial team plays a significant role (Brinckmann and Hoegl, 2011; Peng and Luo, 2000). But in the literature it is less clear how this may be related to managing the relationships between entrepreneurial and large firms.

The fundamental business uncertainty faced by entrepreneurial technology firms, in the exchange with large firms, is huge and sometimes debilitating. It could also be exemplified by institutional uncertainty (Li and Atuahene-Gima, 2001; Peng, 2003), a result of unclear professional norms of behaviour and sometimes unstable government regulations. This may encourage short term-oriented behaviour. The latter is exacerbated, because general business practices may be raw and unpredictable in these fast growing contexts. The entrepreneur's judgment influences decisively actions taken to deal with uncertainty (Mcmullen and Shepherd, 2006).

Besides, finding the right incentives both related to customers and to internal key employees, is a tricky process. Even though entrepreneurial technology firms have a lot to lose from business misbehaviour, it all depends on how visible the behaviour can be. But the cost to the parties of even a rare occurrence is so threatening that they would want to build defences against any such possibilities. Getting key employees to share in property is often not sufficient. It has to be complemented by participation to the decision process.

All of these increase the need for mutual trust, both inside and with outside stakeholders (in particular customers and research partners). The most successful entrepreneurial technology firms, those that generated fruitful knowledge exchange and profitable activities, relied on important entrepreneur's social capital elements. Entrepreneurs' relational capital was particularly important in determining strategy. The higher the relational capital was, the more likely was a strategy of differentiation. This relation was enhanced as reciprocal dependence increased the likelihood of a negative relationship between relational capital and a cost leadership strategy. Relational capital was also a determinant of knowledge exchange and overall performance, the latter being enhanced by reciprocal dependence. So the entrepreneurs' relations seem to have a dramatic effect on strategy and performance, the effect being increased by the strength of reciprocal dependence.



**Table 7** Result of regression analysis for social capital

	Differentiation strategy		Cost-leader strategy		Knowledge exchange		Overall performance	
Ownership	.362	.369	.340	.435	-.052	-.034	.563	.595
Employee number (log)	-.080	-.075	.179	.153	-.134	-.099	-.045	.001
Relational capital	.656***	.642***	.101	.385†	.350*	.224	.404*	.245
Network ties	-.042	-.019	.209†	.218†	.025	.063	.217†	.252†
Cognitive similarities	.172	.173	-.563*	-.484*	.022	-.065	-.035	-.172
Reciprocal dependence	.159	.173	.238	.373**	.417**	.411**	.268†	.258
Relational × reciprocal		-.009		-.317†		.172		.259†
Network × reciprocal		-.051		-.119		-.060		-.074
Cognitive × reciprocal		.194		-.250		.368		.324
R <sup>2</sup>	.585	.603	.233	.406	.323	.396	.299	.382
F	8.914	5.909	1.871	2.581	3.024	2.553	2.636	2.336
ΔR <sup>2</sup>	.376	.018	.231	.173	.207	.073	.213	.083
ΔF	8.600***	.543	2.790*	3.303*	2.906*	1.413	2.810*	1.516
p	.000	.000	.112	.022	.016	.023	.031	.036

Notes: † $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 8** Result of regression analysis for internal cohesiveness

	Differentiation strategy	Cost-leader strategy	Knowledge exchange	Overall performance
Ownership	.505 <sup>†</sup>	-.052	-.035	.335
Employee number (log)	-.190 <sup>†</sup>	.052	-.191	-.157
Value cohesiveness	.365*	.244	.358 <sup>†</sup>	.372 <sup>†</sup>
Incentive cohesiveness	.213 <sup>†</sup>	-.120	.143	.130
Reciprocal dependence	-.077	.173	.286*	.143
Value cohesiveness × reciprocal	-.136	.356 <sup>†</sup>	-.491**	-.499**
Incentive cohesiveness × reciprocal	.101	-.293	.237	.188
R <sup>2</sup>	.402	.086	.363	.245
F	5.119	.698	4.339	2.399
ΔR <sup>2</sup>	.215	.079	.254	.165
ΔF	4.567**	1.072	5.053**	2.692 <sup>†</sup>
P	.001	.629	.003	.056

Notes: <sup>†</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

The entrepreneurs' network ties and cognitive similarity with important others, were also important in explaining outcomes, though less clearly than relational capital. Network ties affect positively the overall performance and a cost strategy. The extent of the entrepreneur's network improves the chances of success, but at the same time increases the chances of adopting a cost strategy. In a sense, it is as if denser networks would encourage growth and then be amicable to a cost strategy. As entrepreneurial network ties may be contingent on changing resource requirements (Sullivan and Ford, 2014), this has to be investigated further.

Cognitive similarities have a negative effect on a cost strategy. They clearly discourage it. As social similarity is a criterion for entrepreneurs' interpersonal tie formation, it imposes constraints on strategy choices that may not be completely satisfactory for entrepreneurs (Vissa, 2011). Although a cost strategy seems to be out of the question in this tightly-knit industry, the relation is somewhat ambiguous. Relational capital and network ties increase the chances of a cost strategy, but cognitive similarities and interactions with reciprocal interdependence reduce such a possibility.

Perhaps also those differentiating or focusing on specific targets are more likely to call on customers and key employees that have similar education and/or experience. As cognition may partially mediate relational capital and network ties of entrepreneurs (DeCarolis et al., 2009), the entrepreneurs seeking differentiation may rely more on the direct use of relational capital and network ties. It is also interesting to notice that where reciprocal dependence is perceived to be high, knowledge exchange is higher and so is overall performance. In such a case, entrepreneurial technology firm's reliance on a cost leadership strategy is discouraged. But the interaction of reciprocal dependence with relational capital creates a new situation, which seems to dominate the effect of relational capital or dependence alone as is obvious in Table 7.

As a conclusion in this first part of our discussion, we could say that, despite some puzzling findings, probably related to the sample size, this research shows that entrepreneurs' social capital affects outcomes in the relationship between entrepreneurial technology firms and large firms as was argued in our first hypothesis. Based on this research, we could state that:

- The higher the entrepreneur's relational capital, the higher the likelihood of a differentiation strategy, the higher the knowledge exchange with large partners and the higher the overall performance of the entrepreneurial technology firm.
- The higher the number of entrepreneur's network ties and the higher the overall performance of the entrepreneurial technology firm.
- The higher the entrepreneur's cognitive similarity with partners, the lower the likelihood of a cost leadership strategy for entrepreneurial technology firms.
- The higher the reciprocal dependence of the entrepreneurial technology firm with large partners, the higher the knowledge exchange with partners and the higher the overall performance.

Our findings also suggest that entrepreneurs' management of internal cohesiveness is at play. Values shared by key personnel of entrepreneurial technology firms enhance knowledge exchange and overall performance and increase the chances of a differentiation strategy. Entrepreneurs' concerns, when they percolate to their subordinates, have a clear effect on outcomes, thus may be seen as the mechanism by

which the entrepreneurial firm ensures consistency and coherence in its dealings with customers and partners. This is probably the source of enhanced trust, richer knowledge exchange and ultimately of enhanced performance. Reciprocal dependence, as seen previously, interacts with values but seem to reduce their influence on both knowledge exchange and overall performance. It is as if mutual dependence leads to more concern, less trusting relationships and higher transaction costs.

Our findings do not show much effect of incentives, except that they confirm the bias toward a differentiation strategy. It is possible that entrepreneurial technology firms' people behaviour is necessarily aligned with concerns of customers and partners. Doing otherwise would be suicidal. As a result, it does not show any difference among entrepreneurial technology firms and has therefore no differential effect on outcomes.

We can then conclude that:

- When key professionals of entrepreneurial technology firms share the same values, a differentiation strategy is preferred, while knowledge exchange and overall performance are enhanced.
- In entrepreneurial technology firms, incentive cohesiveness is biased toward a differentiation strategy.
- Reciprocal dependence of entrepreneurial technology firms and partners enhances knowledge exchange and its interaction with values enhances the chances of a cost-leadership strategy, while reducing both knowledge exchange and overall performance.

In summing up this discussion, we can say that our findings confirm that in new entrepreneurial technology firms that face large uncertainty and stakes, performance is largely determined by the entrepreneur's social capital and his/her management of key people cooperation. First, they shape strategy and generally enhance knowledge exchange and overall performance. When looking at the elements of social capital, the dominant factor appears to be relational capital. However, network ties and cognitive similarity have subtle effects that should be investigated further. When there is mutual, reciprocal dependence, these influences are bent to enhance the effect of social capital or to reduce that of values. We have suggested that reciprocal dependence makes trust more salient, while relational capital has a more dynamic effect on trust, improving it. Values and incentives being highly correlated with relational capital may have the same effect. Network ties and cognitive similarity require more subtle handling to authenticate the relation and may thus introduce a 'delay' in the reaction that could reduce knowledge exchange and overall performance, in this very delicate, high-stakes relationship.

## **6 Conclusions**

New industries, forming in knowledge-intensive contexts, such as CROs', make possible inquiries about relationships between entrepreneurs' social capital and outcomes in the relation of entrepreneurial technology firm and large clients (Krishnan et al., 2006). We have seen that entrepreneurs could play decisive roles in handling their ventures' relationship with large firms to achieve their own success. They use their relational capital, network ties and cognitive similarities to bend strategic choices, improve knowledge exchange and ultimately enhance economic performance. These outcomes are

also influenced by entrepreneurs' management of internal cohesiveness, especially of key people's value cohesiveness.

In general, this paper contributes to a better understanding of relations between entrepreneurial technology firms and large partners. It goes beyond the governance of partners' relations in situations of high uncertainty and stakes (Gulati and Singh, 1998; Gulati and Sytch, 2007). It shows how in such situations, the founding entrepreneur is the kingpin, whose behaviour and network of relations make success or failure. There is a clear relationship between the entrepreneur's social capital and organisational success. Besides, it highlights the role played by key organisational members, when they share in values and benefit from appropriate rewards. Finally, it provides an insight on the role that reciprocal dependence plays in the ensuing entrepreneurial technology firm-large firm relationships.

This study also contributes to the field of entrepreneurial social capital. Specifically, the significant relationship between social capital and outcomes indicates that, in high-stakes relationships, the problems of localisation of information, uncertainty reduction and incentive misalignment are dealt with using the entrepreneur's social capital. Of course, the national or community culture may mediate the effect of social capital (Light and Dana, 2013), but in China the culture does not seem consistent with such entrepreneurial behaviour. This confirms the effect of social capital on strategic resource acquisition (Bouty, 2000), knowledge acquisition and exploitation with key customers (Yli-Renko et al., 2001) and ultimately on competitive advantage (Nahapiet and Ghoshal, 1998) and on firms' strategic orientation (Acquaah, 2007).

An entrepreneur's networking is seen in the literature as important for the success of young technology-intensive ventures (Zhao and Aram, 1995). Our findings suggest that relational capital is more significant where both uncertainty and high-stakes are present. Cognitive similarities play a subtle role, decreasing incentive misalignment by discouraging a cost-leader strategic choice.

We also have brought to attention the impact of internal cohesiveness. It could be regarded as an internal effect of the entrepreneur's social capital that would benefit knowledge transfer, innovation and growth (Maurer et al., 2011; Moran, 2005). Internal management of key people avoids misperceptions and disorientation and aligns practices with intent and commitments. It should therefore affect firm strategy, knowledge exchange and ultimate performance.

Finally our study contributes by showing that the network of relationships, in particular relational capital, are important in building commitments and generating legitimacy. Closeness and reciprocal dependence among firms increase the influence of entrepreneurs' social linkages. In summary, soft factors related to the entrepreneur's relations dominate situations of high stakes and uncertainty and determine small technology firms' outcomes in their relationships with their large customers.

These findings may have significant value for practice as well. In particular large firms may find here a clearer view of the logic behind their small partners' behaviour and adapt the management of their relationships accordingly. The study also generates some implications for entrepreneurs in managing exchange with large firms. First, they need to invest more into direct relational capital building. More attention, time and other resources should be devoted to build and maintain entrepreneurs' direct relationships with key people in partner organisations. Also, entrepreneurs should pay attention to optimise the composition of their networks, making the right choice of the central 'network person friendship' (Bratkovic et al., 2009) and finding the best network density.

It has been shown that relationship number may decrease returns to knowledge creation (McFadyen and Cannella, 2004).

Second, entrepreneurs should increase the internal consistency of values but pay attention to maintain openness at the same time. Value sharing among key people in organisations determines the external strength and influence of entrepreneurial social capital. But there is a potential side effect to strong internal values, as openness and willingness to exchange may decline. This is probably what the effect of reciprocal dependence described earlier was suggesting.

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## Notes

- 1 For Sorensen and Stuart (2008), fundamental uncertainty is the situation where there is at least partial ignorance about the future and an inability to compute probabilities of outcomes.
- 2 In our assessment of differentiation we have taken into account that in this industry: efficiency in conducting experiments is a measure of distinctive behaviour rather than cost-saving.