The Impact of Strategy, Technology, Size and Business Environment on the Organizational Form of Small Firms in China

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Authors' contributions

This work was carried out in collaboration among all authors. Authors GCR and ZX designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. All authors managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Our research tests the hypothesis that the *organizational form* of a small firm is determined by the contingencies of *environment*, *strategy*, *size* and t*echnology*. It was tested on a sample of private firms in Guangdong Province, PR China, notable for its entrepreneurship. Our methodology was novel, involving detailed fieldwork with entrepreneurs for data collection, allied to rigorous econometrics for contingency analysis, using ordered probits. We found that business strategy was the most important determinant of organizational form, followed by new investment, cost leadership, focus strategy and financial aspects (e.g. cash flow, profit expectations). These findings are of interest both to academic researchers and to government bodies responsible for stimulating superior organizational forms in small businesses, like incubator units.

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1. INTRODUCTION

This paper sets out to explore how various contingencies together shape the organizational form of privately-owned firms in the People's Republic of China. Our research is based upon fieldwork evidence on small firms, gathered from face-to-face interviews. Contingency theory holds that the organizational form of a firm does not have a unique desired structure: it depends upon both internal and external constraints [1]. To amplify, it suggests that: (a) there is no single best way to organize the firm for performance purposes [2]; (b) that both the overall form of the firm, and of its sub-systems (e.g. the R&D department, the management group), must be a good fit to its environment [3]; and (c) that the organizational form of the firm, including the way work is performed, and how it is led [4,5] must be consciously designed [6].

Contingency theory has been influential in management [7] and sociology, but especially in economics, including the economics of organization (including agency theory and stewardship theory) [8,9] and of course in accounting, especially management accounting [10,11,12,13,14,15,16]. Extending its applications to small firms has been part of an ongoing phenomenon [17,18,19,20]. The extant literature gives little or no consideration to this approach in powerful emerging economies, like PR China: a research gap we aim to fill.

The first novelty of this paper lies in its extension of mainstream contingency analysis [15,21], from large [22] to small firms. Its second novelty is that it estimates a new econometric model of contingency, rather than using the more familiar case study approach. In doing so, it retains its focus on the effects of *Environment*, *Strategy*, *Size* and *Technology* on *Organizational Form*, but in a quantitative rather than qualitative setting. Its third novelty is that it adapts the contingency approach to small firms *in a non-Western setting* using primary source [23,24] obtained from fieldwork in the People's Republic of China (from here on, simply 'China').

Our general framework is represented in Fig. 1. At the centre is the *Structure* of the firm, which we identify as its *Organizational Form* [25]. The structure of the firm, represented in this way, is regarded as determined by four key variables: The *business environment* [26], the *size of the business* [27,28,29], *technology* [26,30] and

strategy [31,32]. These are shown in four circles (at points North, East, South and West, respectively) around the *Structure* core of *Organizational Form*, in Fig. 1, with causal arrows from these contingencies to the core.

Based on the variables displayed in Fig. 1 and the causality suggested there, we formulate our general hypothesis, in which the *Organizational Form* of a firm is determined by the contingencies of *Environment*, *Strategy*, *Size* and *Technology*. Variables utilised in our treatment are printed in italics, and have been chosen to correspond with intuitive meanings. Further information on their meaning is provided below, backed up by relevant summary statistics in Table 2 (see also Appendix I).

Treating *Organizational Form* as a dependent variable and the others as independent variables, our general hypothesis for a small entrepreneurial firm in the non-Western setting of China is:

H: Organizational form is a function of four contingent factors (each with multiple determinants), namely environment, strategy, size and technology.

1.1 Organizational Form

Theoretically, organizational form (see Centre of Fig. 1) can be formulated as a continuum between two extremes of 'organic' and 'mechanistic'. They may be operationalized by the design of tasks and functions, and by the type of control, authority and communication utilised within the firm [22]. Organic management systems are characterized by an incessant adjustment and redefinition of tasks and functions. This process operates through a 'flat' network of control, authority and communication (involving both top-down and bottom-up, consultative styles) [1] [34]. By contrast, mechanistic management structures display a rather tightly controlled standardized framework, where tasks are precisely defined and functions strictly delineated. In this case, control, authority and communication are strictly hierarchical (being mostly top-down in style). [2] Following

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[1] *More detail in an empirical study of interaction patterns by Courtright et al. [33].*
[2] *Apart from this influential typology of 'organic' and 'mechanistic' structures, there are other taxonomies, such as 'simple' [35], 'bureaucratic' [36] and 'matrix' structures [37]. More innovatively, there arise 'team structure' [38], 'virtual structure' [39], and 'T-form structure' [40].*
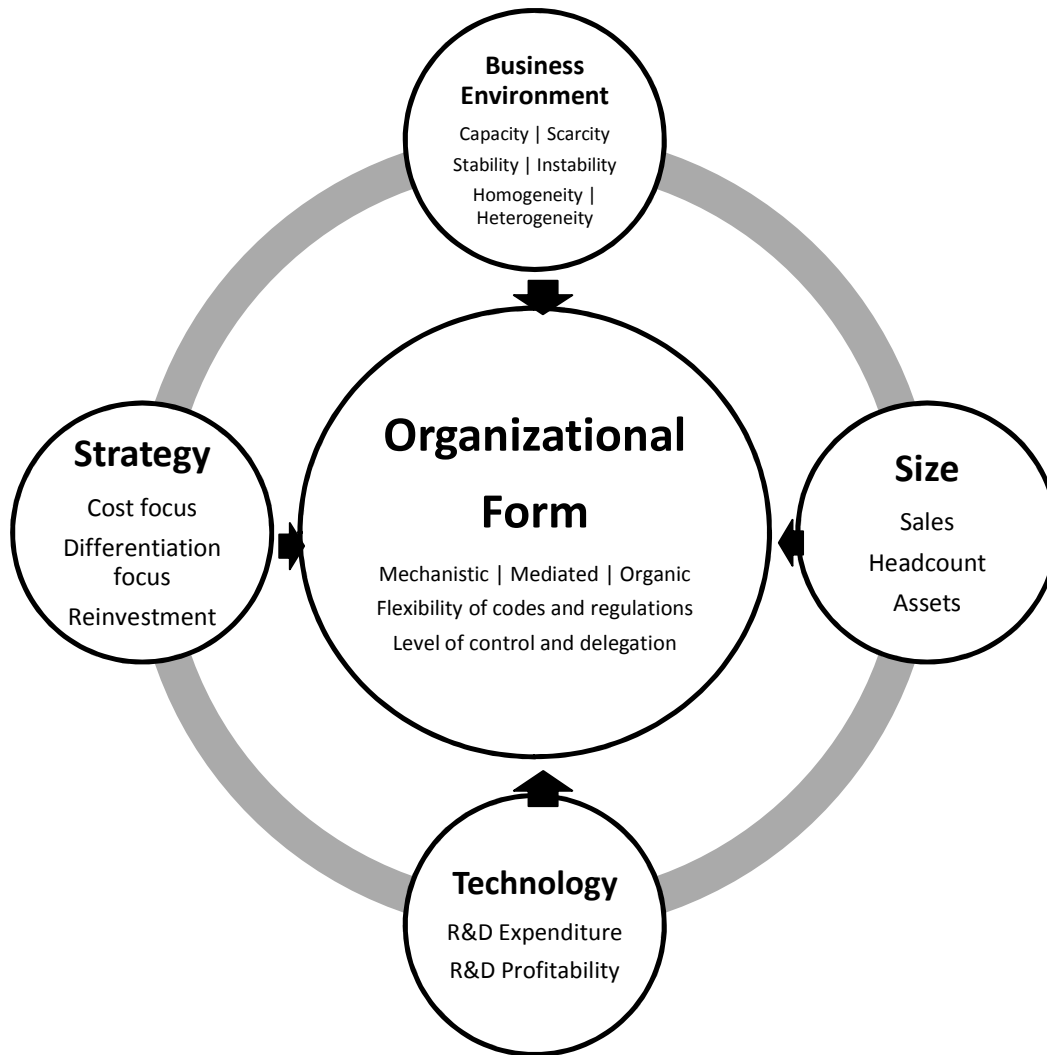
Fig. 1. Explaining the structure of a firm

these ideas, our study calibrates the flexibility of adjusting the firms' company codes and regulations on a three-point scale (*Company Regs*). The level of control is measured by the willingness of entrepreneurs to relinquish some of their power, rather than to retain full control (*Control*) [5]. The extreme of autonomy is represented by a sole individual holding the joint position of both CEO and Director of the board (*CEO*). Communication methods are calibrated according to their smoothness of operation, thus creating the variable for communication within the firm (*Communications*).

In other words, the form of an organization is determined by more than one input: It is intrinsically multi-factorial in nature. It posits that

specifically 4 key factors largely explain organizational form, namely environment, strategy, size and technology. The background for testing of our general hypothesis (H) through a specific linear model (an ordered probit model) is developed below.

1.2 Environment

Though the word 'environment' literally suggests a wide set of relations surrounding the small firm, we used a narrower sense of 'environment' (see North in Fig. 1), adopting the characterisation of [39]. This recognizes three key dimensions of the business environment: capacity/scarcity, stability/instability, and homogeneity/heterogeneity. First, 'capacity' is to be interpreted

in terms of 'richness', 'capability', 'abundance' etc, and at the other end of the spectrum, as 'paucity', 'incapability', and 'sparsity'. For the ultimate aim of superior performance, firms prefer 'mechanistic' structures in a stable and homogeneous market with munificence, whereas they adopt 'organic' management systems to adapt to unstable and heterogeneous conditions with scarce resources. However, the three abstract dimensions of the environment (capacity, stability, homogeneity) need to be operationalized before they can serve an empirical purpose in the econometric model below.

1.3 Capacity

We consider first *Capacity*, which relates to the degree of support provided by the environment for organizational health and development, such as external finance, government policies, as well as choice of location. Becchetti & Trovato [41] noted that the growth of Italian SMEs was largely constrained by the availability of external financing. Hyytinen & Pajarinen [42] argued that voluntary information disclosure of Finnish firms could raise the possibility of external financing, which might lead to excess growth.

1.4 Stability

This dimension refers primarily to the extent of environmental uncertainty associated with the growth of firms. Duncan [43] gauged its impact by 'perceived environment uncertainty (PEU)', using an instrument developed by Milliken [44]. Three factors were determined as (a) state uncertainty (the unpredictability of external conditions), (b) effect uncertainty (the inability to forebode the impact of environmental contingencies on organizations) and (c) response uncertainty (the inaptitude for predicting the likely consequence if a particular response is taken). Early theorists aggregated environmental uncertainties into a single construct [45]. Some argued that environmental uncertainties as a whole have a negative relationship with performance. Gerloff et al. [46] disaggregated environmental uncertainties as they believed that each factor imposed an independent impact on the firm's growth. However, their results were equivocal, and highlighted a need for more research in this area.

1.5 Homogeneity

The third aspect of the business environment has the dimension of *Homogeneity/ heterogeneity*.

This feature is largely connected with market structures and their concomitant competition levels. As Robbins [36] pointed out, homogeneous environments refer to highly concentrated markets with few competitors, in which movements and counter-movements can be easily observed, and to which firms might respond accordingly; whereas heterogeneous markets are assumed to be low concentration with fierce competition.

1.6 Strategy

According to contingency theory, *Strategy* should be designed to suit organizational structure in order to achieve good performance (see West of Fig. 1). Thus, Miller [47] argued that strategies for marketing differentiation, product innovation, breath of market, and cost control all had crucial but different associations with structures. Specifically, Robbins [36] identified three common aspects of strategy in various structures: (a) innovation strategy; (b) cost-minimization strategy; and (c) imitation strategy. However, the 'best fit' between strategy and structure cannot ensure the best outcome, without consideration of the external conditions in which firms actually operate and compete.

Porter's [48,49] theory of competitive advantage derived three generic strategies: Cost leadership, differentiation and focus, later developed by Reid [50] for small firms. The latter found that cost leadership might not result from scale economies but from the flexibility to produce 'a wide variety of batch sizes according to agreed ('bespoke') specification' [50]. Firms could differentiate their offering by aiming for customer satisfaction, through 'the personal touch', and the localization of customers encouraged market fragmentation whilst also fostering competitive advantage.

Apart from competitive strategies, Reid [50] expounded a 'defensive strategy' to 'deter or pre-empt potentially damaging moves by rivals', by showing a strong commitment to re-investment, by palpable intangible asset advantages (e.g. professionalism and trade intelligence), and innovation, by technical advancement. Therefore, we hold that the impact of *Strategy* on *Organizational Form* is underpinned by the firm's level of cost leadership, differentiation and reinvestment.

1.7 Size

The likes of [28] regard the *Size* of an organization as a contingency factor (see East of

Fig. 1) in the field of organizational behaviour, which may be interpreted in terms of sales, headcount or assets. An increase in headcount may make organizational structure more mechanistic, but its marginal effects on organizational structure may be diminishing: implying a less significant impact on a very large firm compared to a small one. After all, larger firms may already be limited by rigidity [51]. Bluedorn [52] found that: (a) as size increases, structural differentiation (the administrative proportion) increases (decreases) at a decreasing rate; (b) the direct effect of size on the administrative proportion is greater than that on structural differentiation; (c) size is negatively related to centralization and positively related to formalization. We therefore argue that size in its various forms (sales, headcount, assets) has an impact on organizational form.

1.8 Technology

Finally, technology (see South in Fig. 1) can potentially be measured as 'innovativeness'. This applies both to the numbers and types of intellectual property created as well as to 'knowledge', for example as embodied in R&D expenditure. Contingency theory regards technology as a pivotal determinant of firm performance, intermediated by organizational structure. Here, we maintain that the impact of innovation [53] can be to 'shape' organizational form by its R&D. This both creates new knowledge *per se* and uses it to more profitable ends.

2. MATERIALS AND METHODS

The evidence used in our paper arose from fieldwork conducted within small and medium sized enterprises (SMEs) in the Guangdong Province of China in 2004.[3] Yeung & Chu [55] identify Guangdong as a province noted for its entrepreneurial ethos, which enjoys the benefits of proximity with Hong Kong, for Hong Kong is sometimes the only conduit through which resources necessary for business success can be channelled [56]. Our fieldwork operations were directed from within the Guangdong University of Foreign Studies. The key sampling criteria were that the SMEs should be privately owned, independent, and located within Guangdong province. Fieldwork contacts were

obtained through entrepreneurial family links [57], as access to the field is particularly difficult in China [58]. 'Snowball' sampling was therefore used [59]. The strength of the design is that each student's fieldwork contact could be reasonably treated as independent of others, and further, few 'chain' contacts were involved. All the interviews were conducted in Mandarin, by students of International Business, who were trained for this task at Guangdong University. The administered questionnaire was in Chinese, culturally adapted from instrumentation first developed by Reid [50]. It covered: general information, enterprise operations, human capital, finance, technology and innovation, the enterprise culture, competition, and the business environment (see Appendix II for key extracts). It was fourteen pages long.

Eighty-three business owners were interviewed in 2004. Thus, this sample size is similar to that used by Haldma & Laats [60], who gathered primary-source evidence from 60 firms in Estonia. We used thirty fieldworkers in total, grouped into teams of three to five individuals. The sampling areas were in the ten largest cities and towns in Guangdong province (see Table 1). Most of these cities and towns have been revitalised since the economic reforms of the post-Mao era, becoming both more diversified and more complex [55].

The correlation between the sample and the population distributions for these cities was 0.754 for Kendall's τ_b (and 0. 877 for Pearson's ρ; Prob = 0.000), so we are confident that we have in our sample a good representation of the population of firms. By employment size distribution, using the Chinese NBS categories, the sample representation was: 93% small, 6% medium and 1% large. Thus 99% of firms were SMEs. From our limited longitudinal evidence, the average firm size was 57 at inception and 211 at interview, which figures, we note for comparative purposes, both lie within the UK size range for an SME (0-249 employees). Such firms are at the lower end of the SME size class, under NBS China criteria.[4] For the several measures of kurtosis we applied to the data we found a positive skew, which is consistent with a wide range of studies, over many countries and over many decades, typically in the context of testing

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[3] *The database and associated documentation on which this research is based is available from the UK Data Service [54].*

[4] *At the time of the fieldwork, employment was the most reliable measure of firm size in China, with firms much larger, on average, than in the West. Official size categories by employment were: 'small' 0-599; 'medium' 600- 2,999; and 'large' 3,000.*

Table 1. Sampling distribution by major cities in Guangdong Province

Code	City/County	Firms	Percent
1	Guangzhou	48	57.8
2	Shenzhen	8	9.6
3	Foshan	7	8.4
4	Jiangmen	4	4.8
5	Dongguan	4	4.8
6	Huizhou	3	3.6
7	Yangjiang	3	3.6
8	Qingyuan	2	2.4
9	Jieyang	2	2.4
10	Shantou	2	2.4
	Total	**83**	**100**

Source: National Bureau of Statistics of China 2004

Gibrat's Law (e.g. Park et al. [61] in a Korean context and also Reid & Xu [62] in a Chinese context). Overall, therefore, we are very confident that our sample composition is representative.

We now operationalize the concepts of *Organizational Form* and our four major contingency factors (i.e. *Environment*, *Strategy*, *Size* and *Technology*), moving from a consideration of the theoretical reasoning underlying a variable to the way in which the variable can be operationalized. This is done as a preliminary to the use of these variables in an estimated ordered probit model of contingency.

For our purposes, *Environment* is regarded as 'munificent' if a firm experiences few external financing difficulties [41], enjoys supportive government policies [63] and has an advantageous location [64]. In our analysis, the capacity/scarcity dimensions of the Environment are proxied by the cash flow problems during operation (*Cash Flow Problems*), the number of government financial sponsorships (*Financial Sponsorship*) and the number of government nurturing policies, which might also relate to locational advantage (*Government Support*).

As regards the stability/instability measure of the environment, we adopt the simple approach of [43] in using a three-point scale to calibrate self-perceived business prospects, relating to employment, profit, net sales and net assets, respectively. If respondents choose the option of change (i.e. 'increase' or 'decrease'), as distinct from unaffected, we interpret the environment as being (technically) 'unstable', in the sense of being liable to change, or not involving stasis. Choosing the option 'no influence' (i.e. stasis) reveals the interviewees' perception of there being a relatively stable environment, into the

near future at least. Thus, our adopted procedure was to use four binary variables (dichotomised on change/unaffected) for calibrating stability, these being based on prospective future levels of employment, profit, sales and assets, as represented by the variables *Employment Impact*, *Profit Impact*, *Sales Impact*, and *Assets Impact*.

As Robbins [36] suggested, a homogeneous environment was associated with a highly concentrated market having few major competitors; while a heterogeneous environment was associated with low market concentration and fierce competition. Although the market extent and the market share measures in the database can partially reflect the market position of a firm, it cannot entirely capture its entire market situation. Thus, a three-point scale is used to describe the self-perceived intensity of market competition (*Strength of Competition*). In addition to this, we created a four-point measure of the degree of difficulty in entering the market (*Ease of Entry*), as higher entry barriers may result in a more homogeneous product environment.

Although Hannan & Freeman [65] were unconvinced that the actions of humans could significantly influence their business environment, Child [66] asserted that there were good prospects of power-holders within an organization using strategic actions to manipulate their environment, to better fit their organization's form. Our own study adopts Porter's [48,49] competitive advantage theory for improving firm performance, and utilizes his 'generic strategies' in a binary form, emphasising cost leadership (*Cost*) and a differentiation strategy (*Differentiation*). In addition, as regards strategy, while Porter's [48] forces of competition analysis was originally intended for large firms, it

was developed later by Reid et al. [67] within a small business context. Here, one of many possible strategies might be annual reinvestments, which we measure by *New Investment*, to account for more effective competition against incumbents [31,68].

Size is regarded as a key contingency factor in organization theory [6,28]. In keeping with this literature, size is operationalized by the number of employees (*Employment*), total net assets (*Total Assets*) or total net sales (*Sales*), as alternative measures. The size of an enterprise, in association with other causal factors, is important in explaining organizational form, but its impact is sensitive to the way in which size is measured.

Finally, Woodward [69] developed a 'technological scale' in terms of production techniques and the complexity of production systems. This saw technology as made up of: (a) unit or small batch, (b) large batch or mass production, (c) continuous process. While entrepreneurs often accept 'bespoke' orders for some products, they also are keen to engage in mass production for others, if possible. Constrained by such complexity, this study uses two proxy variables under the heading of technology: R&D expenditure (*R&D Expenditure*); and the return on research capital (RORC) investment, measured as the ratio of R&D expenditure to total profit (*R&D Profitability*).[5]

We find that *Company Regs* and *Control* are positively correlated (Pearson's correlation 0.214, significant at the 0.05 level, one tailed), which means that the more flexible the adjustment of firm's company regulations and the flatter the network of controls (i.e. the less hierarchical), the closer this is to an organic management style, and vice versa. However, no significant correlations were found with the other two variables (*CEO* and *Communications*). Hence, we define organizational structure as a weighted measure, with equal weight given to *Company Regs* (50%) and *Control* (50%). Using this weighting, a metric for the variable *Organizational Form* was defined,[6] with a firm's

structure being categorized as being one of: mechanistic (0), mediated (1) or organic (2), using three intervals on the real line between the values of one and three. A complete list of definitions of variables in this paper, and associated questions translated from the Chinese administered questionnaire, can be found in Appendices I and II at the end of this paper. We now present the summary statistics for all variables used in our analysis: first, organizational form; and, second, four sets of contingency variables under the headings of *Environment*, *Strategy*, *Size* and *Technology*, as reported in Table 2. From the summary statistics, brief comments can be made about the 'typical' firm in this dataset, as follows.

The organizational structure (*Organizational Form*) of a 'typical' firm is quite 'organic', with the mean (of 1.688) being in the upper range of magnitude, towards 2. The capacity dimension of the *Environment* is interesting, since this 'typical' firm apparently encounters almost no cash flow problem (*Cash Flow Problems*) in the course of its operation, although the government support policies (*Government Support*) and financial sponsorship (*Financial Sponsorship*) are commonly perceived to be deficient. The stability of the *Environment* is limited, but at least seems promising if not buoyant, as performance, in terms of sales (*Sales Impact*), assets (*Assets Impact*), and profits (*Profit Impact*) are all expected to increase. However, this is not true of employment (*Employment Impact*), which may be understandable, as progress may involve the shedding of labour, especially if accompanied by innovation (see below on *Technology*). Finally, the business *Environment* appears to be characterised by product heterogeneity, no doubt encouraged by strong competition (*Strength of Competition*) and the ease of market entry (*Ease of Entry*).

With regard to the *Strategy* adopted by this 'typical' firm, whilst cost leadership (*Cost Focus*) seems to be underutilized, product differentiation (*Differentiation Focus*) seems rather popular. Further, this 'typical' firm has not habitually reinvested (*New Investment*) in a market. Considering size, whichever measure is employed (*Total Assets, Employment, Sales*), the 'typical' firm is most likely to fall into the category of an SME. We note that the size distribution for each measure has a strong positive skew, and is very peaked (viz. leptokurtic) for the assets and employment measures. As for technological innovation, even though it could said to be at a moderate level,

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[5] *This measure indicates what kind of financial return a company is realizing from its R&D expenditures [70].*
[6] *The threshold values were as follows. A score of 1 to below 1.5 defined a firm as Mechanistic, with the Organizational Form variable taking the value 0. The other ranges were: from 1.5 to below 2.5 for Mediated (1); and from 2.5 to 3 for Organic (2).*

Table 2. Descriptive statistics

Variable	N	Min.	Max.	Mean	Std. Dev.	Skewness	Std. Dev.	Kurtosis	Std. Dev.
1.Structure	80	0.00	2.00	1.69	0.65	-1.88	0.27	2.11	0.53
2.Environment									
Cash Flow Problems	83	0.00	1.00	0.10	0.30	2.79	0.26	5.90	0.52
Government Support	83	1.00	3.00	1.25	0.51	1.96	0.26	3.06	0.52
Financial Sponsorship	83	0.00	6.00	0.90	1.06	2.18	0.26	7.68	0.52
Assets Impact	82	0.00	1.00	0.70	0.46	-0.86	0.27	-1.29	0.53
Employment Impact	82	0.00	1.00	0.57	0.50	-0.30	0.27	-1.96	0.53
Profit Impact	82	0.00	1.00	0.78	0.42	-1.38	0.27	-0.10	0.53
Sales Impact	83	0.00	1.00	0.82	0.39	-1.69	0.26	0.88	0.52
Strength of Competition	82	1.00	3.00	2.63	0.62	-1.49	0.27	1.12	0.53
Ease of Entry	83	1.00	4.00	2.33	0.68	0.19	0.26	-0.00	0.52
3.Strategy									
Cost Focus	83	0.00	1.00	0.23	0.42	1.31	0.26	-0.28	0.52
Differentiation Focus	83	0.00	1.00	0.65	0.48	-0.64	0.26	-1.63	0.52
New Investment	83	0.00	2.00	0.50	0.46	1.28	0.26	1.79	0.52
4. Size									
Total Assets	75	5.00	58696.0	4045.8	9159.6	4.06	0.28	19.51	0.55
Employment	83	4.00	3000.0	205.4	449.2	4.18	0.26	20.45	0.52
Sales	74	5.00	23000.0	3328.7	4771.9	2.18	0.28	5.07	0.55
5.Technology									
R&D Profitability	82	1.000	5.00	2.02	1.22	0.99	0.26	-0.12	0.52
R&D Expenditure	83	1.000	5.00	1.95	1.31	1.27	0.26	0.36	0.52

judged by this typical firm's R&D profitability and expenditure (*R&D Profitability, R&D Expenditure*), we know from further evidence that there is often little willingness to adopt international standards (ISO) for innovation, and that it is rare to attempt to protect an innovation by patenting.

3. RESULTS AND DISCUSSION

We now turn to our model of the key elements of contingency theory, and how it can be tested by econometric methods. Our brief summary above of the core empirical evidence and analysis underpinning contingency theory of organizational form is that it identifies opposite ends of the spectrum to lie with *organic* and *mechanistic* organizational forms, with the *mediated* forms lying between these two. The *organic* form may appeal to relatively small firms who are able to adopt more flexible and innovative production technologies than larger firms. Such small firms can readily adopt extreme product differentiation strategies in highly competitive and changeable environments. On the other hand, the *mechanistic* form may be more appealing to relatively large firms who are committed to large-scale or mass production technologies, and are keen to exploit economies of scale. Therefore, they usually

prefer a cost leadership strategy. Between these two ends of the spectrum we have interposed the category of a *mediated* organizational form, suggesting not complete flexibility, but at least some degree of flexibility of strategy, and also the ability to exploit moderate economies of scale, and to undertake some product differentiation and moderate incremental innovation.

We now have the basis for our modelling. It says that *Organizational Form* (a variable ≡ *Structure*) is specified as an ordered dependent variable. This is explained by the four contingency factors, *Environment*, *Strategy*, *Size, Technology*, and by additional random factors.

Structure = F(*Environment*, *Strategy*, *Size, Technology*; *Random Variable*)   (1)

A number of simplifying assumptions are made. First, the function F(.) is assumed to be linear in both parameters and variables. Second, *Structure* is specified as *ordinal* variable, being represented by an ordered, count variable. The general hypothesis expressed by (1) is now expressed formally as an *ordered probit* model of contingency:

$$y^* = x'\beta + \varepsilon \qquad (2)$$

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where y^* is *Structure*, the unobserved ordinal measure of organizational form, x is a vector of explanatory (*Environment*, *Strategy*, *Size, Technology*) and control variables, $\varepsilon \sim N(0, 1)$ is a *Random Variable* and β is a vector of estimable coefficients. As y^* is unobserved, we used a fieldwork proxy for it, denoted by y, with properties:

$$y = 0 \text{ if } y^* \leq 0 \qquad\qquad (3)$$
$$\quad = 1 \text{ if } 0 < y^* \leq \mu$$
$$\quad = 2 \text{ if } \mu < y^*$$

where μ is a threshold parameter. The symbol y in inequalities (3) denotes the variable *Organizational Form* for the small firm, which is categorised as being: mechanistic (0), mediated (1), or organic (2), as indicated in the core circle in Fig. 1. Given this, our ordered probit model was estimated by the method of maximum likelihood on our cross-section of data on 83 firms, obtained from the fieldwork interviews.

The statistical model appropriate to estimating equations (1) to (3) is the ordered probit model [71], for which results will be reported here. The maximum likelihood estimates are given in Table 3, for a full sample size of N = 83 (with some missing observations for specific variables). The coefficients of all variables (the contingency factors and control variables) are reported along with their standard errors, standard normal (z) values and probability values. At the bottom of Table 3 we report: The log likelihood for the full model; an overall goodness of fit measure (Pseudo-R^2); and the likelihood ratio (LR) statistic (a χ^2 variable) and its probability value.[7]

We observe that under each of the four contingency types in Table 3 there are significant variables: three under *Environment*; three under *Strategy*; two under *Size*; and one under *Technology*. According to the summary diagnostics at the bottom of Table 3, the overall fit of the ordered probit is good, and highly significant, for we have a LR statistic (with 16 d.f.) of 48.6, which highly significant (at the 0.0001 level). The familiar goodness of fit measure (a Pseudo-R^2, expressed in terms of the LR Index) is 0.52, which is high for a cross-section model of the sort we are using. We therefore find strong support for our hypothesis (H) that a multifactorial, rather than unifactorial explanation of organizational form is appropriate. That is the organizational form of these small firm is determined by a number of defining factors, working in conjunction.

Looking at the specific factors determining organizational form, we find that, under each of their main headings, namely *Business Environment*, *Strategy*, *Size* and *Technology*, there are several significant variables, typically at the 5% level or better. We therefore find support for our interpretation of Hypothesis H that these are indeed the key factors. The determinants of the organizational form of the firm are embodied in a combination of the business environment, the strategy adopted, the size of the firm and the technology employed. Our findings are set out under the headings of the four contingencies of Fig. 1, namely environment, strategy, size and technology, as follows.

3.1 Environment

First, although several of the variables under the business environment (*Environment*) heading have low significance, three have clear significance. These are: The experience of cash flow problems during past operation (*Cash Flow Problems*); the number of supportive government policies received by a firm (*Government Support*); and the stability of the firm's environment in terms of the prospects for gross profits (*Profit Impact*). To amplify this finding, if a firm had suffered financing problems in the past, benefited from additional government support, and expected variable margins, it would be more likely to adjust its organizational structure towards the organic style, entailing greater flexibility in its organizational form. This confirms our view that the firm's business environment does indeed impact upon its organizational form [39] and that the main factors in this sense derive from the existence of cash flow problems and the firm's expectations that the business environment will have an impact upon profit [42].

3.2 Strategy

Second, three variables (*New Investment, Differentiation Focus, Cost Focus*), under the heading of *Strategy*, are all highly statistically significant (at the 5% level or better) and have interesting interpretative content. *New

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[7] *Initially, 38 explanatory variables were included in a comprehensive model. The large number of regressors, impeded estimation due to multicollinearity. Therefore we removed the redundant predictors whilst maintaining the major constructs. The remaining 17 independent variables are incorporated into the ordered logit model reported here. Our coefficient estimates are robust and significant.*

Investment is positively related to organizational structure. Thus more adventurous entrepreneurs would prefer to move to more organic and flexible organizational forms. In terms of business strategy [48,49], the combination of a focus strategy combining both product differentiation and cost leadership is well fitted to these changing circumstances. We also find that the variable *Cost Focus* shows a significantly positive sign, which, *per contra* to studies of large firms, does make sense in our current context of small firms. In our context we see that a cost focus strategy [47] can also promote an organic structure. The analysis of the price elasticity of demand may help to explain this, in terms of kinked demand curve analysis [72]. In this type of analysis, which is well supported by the descriptive statistics from fieldwork interviews,

the demand curve of the typical firm is highly elastic for price increases beyond the prevailing industry price, as rivals are reluctant to match price increases, and highly inelastic for prices decreases, as alert rivals quickly follow price cuts, fearing losses of market share if they do not do so. Such a dynamic of price changes is typical of the Chinese private firm in the sample. If not much price discretion is possible, Chinese owner-managers may feel they are left with few other options. However, on the cost side, they must be flexible enough constantly to seek out new and better methods of controlling their costs, Robbins [36], given their ultimate purpose of profit-maximization [31]. To summarize, we conclude that strategy, in all its dimensions, is important in explaining organizational form, thus supporting the analysis above.

Table 3. The ordered probit model of contingency theory (n=64)

Variable	Coefficient	Std. error	z-Statistic	Prob.
Environment				
Cash Flow Problems	6.84	2.84	2.41	0.02[**]
Government Support	1.26	0.77	1.65	0.10[*]
Financial Sponsorship	3.34	2.04	1.64	0.10
Profit Impact	3.64	1.66	2.19	0.03[**]
Sales Impact	-1.00	1.76	-1.13	0.26
Employment Impact	-0.30	1.14	-0.26	0.79
Assets Impact	-0.22	1.41	-0.15	0.88
Strength of Competition	0.68	1.04	0.65	0.52
Ease of Entry	0.29	0.88	0.32	0.75
Strategy				
New Investment	7.03	3.50	2.01	0.05[**]
Cost Focus	7.78	2.70	2.88	0.00[***]
Differentiation Focus	8.73	2.56	3.41	0.00[***]
Size				
Total Assets	-0.00	0.00	-1.97	0.05[**]
Sales	0.00	0.00	2.45	0.01[**]
Employment	0.85	0.67	1.28	0.20
Technology				
R&D Expenditure	-2.40	1.13	-2.13	0.03[**]
R&D Profitability	1.09	0.81	1.34	0.18
Limit points				
LIMIT_1:C(18)	12.58	5.57	2.26	0.02[**]
LIMIT_2:C(19)	15.03	5.75	2.61	0.01[***]

Log likelihood	-22.67			
Restr. Log likelihood	-46.96			
LR Index (Pseudo-R2)	0.52			
LR statistic (16 df)	48.57			
Probability (LR stat)	0.00			

[***]p < .10
[**]p < .05
[*]p < .01

3.3 Size

Third, the relationship between size and organizational structure seems more complex than might have been expected. Our general impression, based on fieldwork, descriptive statistics and our econometric analysis, is that smaller firms tend to be more organic and larger firms more mechanistic. To explore the robustness of this finding, three size measures were deployed and the results are disparate, perhaps not surprisingly so. When size is measured by employment (*Employment*), no significant impact on organizational form can be found. But, in this context, it should be borne in mind that the mean size of these firms is 205 employees, and some firms in the sample can be much bigger. Thus, what we essentially have is a mix of firm types, by employment size, some of which may be relatively large and therefore might best be characterized as mechanistic in organizational form.

Turning now to size measured by total net assets (*Total Assets*), we find that firms with smaller assets need to adopt more flexible organizational forms. This result is explicable in terms of the generally asset-starved milieu in which these Chinese firms function; you compensate for lack of assets by nimbleness. When we look at size measured by total net sales (*Sales*) the picture is very different. The larger the revenue generated by a firm, the greater is its adaptation to an organic management style. This may arise because the larger our sales [28], the greater is the pressure on the business to avoid the downsides of overtrading, which may best be achieved by greater flexibility in the firm. This finding can be contrasted with the consequences of achieving larger size in terms of assets [52], which can create more bureaucratic pressure for formality in the administrative procedures of the organizational form of the firm. By contrast, achieving larger sales can be pursued in ways which allow firms more discretion, and may indeed stimulate more flexibility in what Blau & Schoenherr [73] call the 'productive portion' of a firm's structure. These results also buttress the finding of [74] indicating that different size measures should naturally have different interpretative consequences and, by corollary, should lead to varying results. We have therefore found support for the analysis of above, namely that organizational form is influenced by size, but in ways which differ, depending upon how size itself is measured.

3.4 Technology

Finally, we turn to the impact of technology on organizational form. We have two measures of technology, namely, *R&D Expenditure*; and *R&D Profitability*, expressed as a measure of the return on R&D investment. We note, with no great surprise, that the *R&D Profitability* variable is not significant. This is probably not surprising, since what is being reported upon in the *R&D Profitability* variable is measured in a ratio form, which conflates the independent influences of R&D and profit alone on organizational form. Generally, SMEs in China suffer from insufficient R&D resources, and a lack of research personnel, even in Guangdong Province, which is noted for having higher levels of market-driven R&D than any other province [75]. Furthermore, R&D profitability is very much lower in China than in other economies which are relevant yardstick comparators e.g. the USA, Japan [76]. We conclude that, for this measure of technology, its impact on organizational form is slight, and certainly not statistically significant, partly confirming the analysis above.

We also note from Table 3 that the *R&D Expenditure* variable is negative and significant (at the 5% level). This is an intriguing result, as the negative coefficient implies that the more innovative firms in our sample have more mechanistic, rather than organic, structures. In making sense of this result, it must be borne in mind that the variable *R&D Expenditure* here is designed for those firms with established R&D departments, and the lowest values are assigned to those firms that do not have such departments. Within our sample, less than half (48%) of firms had a special R&D department, with most of the rest claiming no need for such a department. Those Chinese SMEs that spend relatively large sums of capital on R&D typically have full structures of research teams (and even sometimes branches thereof) and large quantities of formal equipment. Their production scales are typically large, and their market positions well established. Essentially, such firms have routinized R&D-led production. At the other end of the spectrum are firms with a low spend on R&D and typically no formal R&D department, as such. They typically do not have large scales of production, nor is their market position well established, which are all barriers to innovation [77]. To survive on this lower R&D resource base, Tsai et al. [78], they often resort to small batch production of 'bespoke' orders, which method flourishes in relatively flexible and

organic firms. Furthermore, most small batch production requires no breakthrough in technology, but rather the light, carefully mediated modification of current products or productive processes. In sum, larger SMEs are associated with more rigid organizational structures and smaller firms with more flexible, organic structures, so far as R&D expenditure is concerned. We conclude, therefore, that the impact of technology on organizational form is either slight or is negative. If the latter, the greater the technological input, the more mediated or mechanistic is the organizational form.

4. CONCLUSION

Our paper is novel in extending the developments of contingency theory [21], to both (a) a non-Western setting and (b) to small, rather than large firms. Our aim was to test whether contingency theory could be applied in this alternative Chinese context. Briefly, we find that indeed this theory can be extended to non-Western settings involving small entrepreneurial firms. In detail our findings are as follows. First, we find that cash flow problems, the impact of business conditions on profit and government support policies are the most significant factors amongst the *Environmental* variables. Second, under the *Strategy* variables, investment stage, cost focus and a differentiation focus strategy are all highly significant in their impacts on organizational form. Third, of our available *Technology* variables, R&D expenditure had the most significant impact on organizational form. Finally, of our various measures of *Size*, sales and total assets were found to be the most significant control variables in explaining organizational form. Our analysis allows us to identify where a small firm lies in a typology of firm - from among those which are mechanistic, at one end of a spectrum, to those which are organic at the other end, to those which lie somewhere in between. This should help to guide policy makers, who are tasked to improve small firm performance, to make better informed decisions about support for Chinese entrepreneurial ventures, for example, through future Government initiatives or strategic financial investment.

CONSENT

As per university standards, participants' written consent were collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDICES

Appendix I. Definition of variables used in main text

Variable	Question	Definition
Assets Impact	8.5	=1 if a firm expects the business environment to influence assets, 0 otherwise
Cash Flow Problems	4.6	=1 if a firm has serious cash flow problems during the operation in the past, 0 otherwise
CEO	3.6	=1 if CEO and the board director is the same person, 0 otherwise
Communications	5.11	The number of communication methods
Company Regs	6.4	The flexibility to change internal company codes and regulations: low (1), medium (2), high (3)
Control	3.3	The level of control: (1) low, (2) medium, (3) strong
Cost Focus	7.6	=1 if a firm takes cost leadership strategy, 0 otherwise
Differentiation Focus	7.6	=1 if a firm follows a focus strategy, 0 otherwise
Ease of Entry	7.3.1	The difficulty of entry: very difficult (1), somewhat difficult (2), somewhat easy (3), very easy (4)
Employment	1.2	Number of full-time employees in 2004
Employment Impact	8.5	=1 if a firm expects the business environment to influence employment, 0 otherwise
Financial Sponsorship	8.2	The degree of financial sponsorship: low (1), medium (2), high (3)
Government Support	8.1	The number of supportive government policies received by a firm
New Investment	4.7	New investments per year
Profit Impact	8.5	=1 if a firm expects the business environment to influence profits, 0 otherwise
R&D Expenditure	5.2	The amount of money spent on R&D activities in 2004: very small (1), somewhat below medium (2), medium (3), somewhat above medium (4), very large (5)
R&D Profitability	5.9.2	The ratio of R&D expenditure to profit: very low (1), somewhat below medium (2), medium (3), somewhat above medium (4), very high (5)
Sales	2.9	The monetary value of total sales in 2003
Sales Impact	8.5	=1 if a firm expects the business environment to influence sales, 0 otherwise
Strength of Competition	7.3	Description of market competition: weak (1), medium (2), strong (3)
Structure	n/a	Weighted measure of Company Regs (50%) and Control (50%): = 0 Mechanistic; =1 Mediated; =2 Organic
Total Assets	4.2	The monetary value of total assets in 2003

Appendix II.

Translation of selected questions from administered questionnaire

1.2 Current full-time employment：

2.9 　　What was the total sales of the company in 2003? 　 . 　RMB (Chinese Renminbi)

3.3 Will you fully authorize a person at work if he/she is highly professional and trustworthy?
A. 　　Yes, absolutely. 　　　　　　　　　　　　　　　　　　　　□
B. 　　Yes, but it depends on the task sometimes. 　　　　　　　　□
C. 　　No, I trust myself better. 　　　　　　　　　　　　　　　　□
D. 　　Impossible to find such a person. 　　　　　　　　　　　　□

3.6 Is the general manager and the chairman of the board the same person?
　　　　YES 　　　　　　　　　　　　　　　　　　　□
　　　　NO 　　　　　　　　　　　　　　　　　　　□

4.2 　　What were the total assets when the firm was founded? 　　　　(RMB)

4.6 Have any cashflow problems ever occurred in the past (tick all that apply)？
A. 　Difficult to get back the receivables 　□ 　E. Inadequate credit policy with suppliers 　□
B. 　Expanding too quickly/overinvestment 　□ 　F. Insufficient overdraft facilities 　　　　□
C. 　Limited amount of overdraft 　　　　　□ 　G. management cost considerably high 　　□
D. 　Fluctuation of inputs prices 　　　　　□ 　H. no cashflow problem 　　　　　　　　□

4.7 Has there been any further investment since the establishment of the firm?
　　　　YES 　　　　　　　　　　　　　　　　　　　□
　　　　NO 　　　　　　　　　　　　　　　　　　　□

5.2 Approximately how much is spent on R&D per annum？(in RMB)
A. 　　<50,000 　　　　　　　　　　　　　　□
B 　　50-100,000 　　　　　　　　　　　　　□
C. 　　110-200,000 　　　　　　　　　　　　□
D. 　　210-500,000 　　　　　　　　　　　　□
E. 　　0.51-1 million 　　　　　　　　　　　□
F. 　　> 1 million 　　　　　　　　　　　　　□

5.9.2 Approximately what percentage of profits has the company has spent on R&D in the last year?
A. 　　<5% 　　　　　□ 　　F. 40-49% 　　　　　□
B. 　　6-10% 　　　　□ 　　G. 50-59% 　　　　　□
C. 　　11-19% 　　　□ 　　H. 60-80% 　　　　　□
D. 　　20-39% 　　　□ 　　I. >80% 　　　　　　□
E. 　　30-39% 　　　□

5.11 What is the major software used in the office? (tick all that apply）
A. 　　office software 　　　　　　　　　　□
B. 　　accounting software 　　　　　　　　□
C. 　　HRM software 　　　　　　　　　　　□
D. 　　communication software 　　　　　　□
E. 　　logistics management software 　　　□
F. 　　customer service software 　　　　　□
G. 　　Other 　　　　　　　　　　　　　　□

6.4 How would you describe company governance/regulations?
A.   Setup in the early stage and very complete   □
B.   update regularly   □
C.   It depends on the real situation   □

7.3 How would you describe the industry where your firm operates?
A.   Early stage of the industry   □
B.   Still lots of space to grow   □
C.   Reach maturity   □
D.   Extremely competitive   □
E.   Sunset industry   □
F.   The industry is nearly dead so as to plan to quit. □

7.3.1 If one wants to get in this industry, how easy would it be?
A.   Very hard   □
B.   A little hard   □
C.   Kind of easy   □
D.   Very easy   □

7.6   What strategies will you adopt in order to strengthen the core competitiveness of your firm?
A.   Lower cost   □   B. more products   □
C.   Adopt both   □   D. adopt either of them □

8.1 Has your firm received any government sponsorship?
A.   Township enterprise development funds   □
B.   SME credit guarantee scheme   □
C.   High-tech SME innovation Funds   □
D.   Other   □
E.   No government sponsorship received   □

8.2 Has your firm enjoyed any type of tax reduction policy?
A.   High-tech companies income tax reduction   □
B.   Technology innovation subsidies   □
C.   Subsidies for buying equipment made-in-China   □
D.   Township enterprise income tax reduction   □
E.   Job-creation for city laid-offs income tax reduction □
F.   Export drawback   □
G.   University factories/welfare factories income tax reduction □
H.   Small companies income tax reduction   □
I.   Minority region income tax reduction   □
J.   Other

8.5 Considering all the elements we have discussed in this and the previous sections, you would expect your firm in the next year to:

Employment :	Grow □	Stay unchanged □	Decrease □
Profits:	Grow □	Stay unchanged □	Decrease □
Sales:	Grow □	Stay unchanged □	Decrease □
Total Assets:	Grow □	Stay unchanged □	Decrease □

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