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What Drives Marketing and Organizational Innovation in the Food Industry? A Comparison between Italy and Germany

Stefano Ciliberti[a], Laura Carraresi[b], Stefanie Bröring[c]

[a] *Department of Agricultural, Environmental and Food Sciences, University of Perugia, Italy*
[b] *Institute for Food and Resource Economics, Chair for Technology and Innovation Management in Agribusiness, University of Bonn, Germany*
[c] *Institute for Food and Resource Economics, Chair for Technology and Innovation Management in Agribusiness, University of Bonn, Germany*

stefano.ciliberti@unipg.it, l.carraresi@ilr.uni-bonn.de, s.broering@ilr.uni-bonn.de

ABSTRACT

In the food industry low amounts of capital are invested in innovation and R&D and companies are mainly engaged in developing product and process innovations in order to keep up with continuously changing consumer preferences. Notwithstanding, marketing and organizational innovation are becoming pivotal for food companies in order to specifically meet these preferences, and develop new business practices which allow them to implement successful external relationships aimed at a greater and successful innovation activity.
In this regard, the present paper aims to shed lights on the determinants of both types of non-technological innovations in two of the largest EU food and drink producers by turnover and value added: Italy and Germany. To this purpose, an econometric analysis is run using microdata of the Community Innovation Survey (CIS) carried out in 2012.
Results highlight that, apart from some significant differences concerning the role of knowledge sources, training activities represent a relevant driver for both marketing and organizational innovations in both countries.

Keywords: *Food industry; marketing innovation; organizational innovation; CIS; Italy; Germany.*

1. Introduction

In the food sector, companies have to increasingly deal with the so-called "consumer-driven innovation process" (Kemp, 2013) which implies a growing role of consumers along the innovation pathway (Ciliberti et al., 2016a; Bigliardi and Galati, 2013; Fortuin and Omta, 2009; Guerrero et al., 2009; von Hippel, 2005). Although it is widely acknowledged that the food industry invests low amounts of capital in innovation and R&D, compared to other industrial sectors, companies are more and more engaged in developing product and process innovations in order to keep up with continuously changing consumer preferences (Capitanio et al., 2010; Avermaete et al. 2004). To this end food companies should focus not only on technological innovation, but also on **marketing innovation**, defined as "the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing" (OECD, 2005; p. 49), which is getting momentum in the recent years (Moreira et al., 2012). Indeed, marketing innovation allows a better understanding of demand by

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translating into new products specific features, according to target markets and/or consumers (Trienekens et al., 2008). Moreover, by exploring new markets firms can create new expectations, set new standards, as well as satisfy consumer preferences, also introducing new trends, which might lead to long run reputation to the customers (Maciariello, 2009; Zaharia et al., 2010; Drucker, 2007).

At the same time, it should be noted that product and process innovations are also increasingly driven by new technologies and knowledge stemming from supporting sectors located in the upstream part of the supply chain or even belonging to completely separated industries (Cricelli et al., 2016; Costa et al., 2015; Robertson and Patel, 2007). This means that, in addition to consumers, food companies are more and more pushed to "open" their organizations in order to cooperate with firms in other sectors and also to acquire new external competencies in order to be successful in innovation (Garcia Martinez, 2013; Sarkar and Costa, 2008). For this purpose, companies rely on **organizational innovation** that the Oslo Manual defines as "the implementation of a new organizational method in the firm's business practices, workplace organization or external relations" (OECD, 2005, p. 51). Therefore, it includes strategic decisions taken by managers so as to more effectively arrange procedures (e.g. supply chain and/or knowledge management) and external cooperation (e.g. first use of outsourcing, alliances and so on). Organizational innovation has been recognized in previous literature to play a relevant role in order for the firms to be competitive (Armbruster et al., 2008; Caroli and Van Reenen, 2001; Greenan, 2003). Indeed, an analysis carried out in Germany indicated that the share of companies introducing non-technological innovations equals that of those conducting technological innovations (60%), and in particular organizational innovation exceeds the other typologies of innovation; more specifically, in the food and beverage sector, the non-technological innovators are higher than only technological innovators (Schmidt and Rammer, 2007). Another research carried out in Italy showed that the overall innovative performance in the manufacturing sector is positively influenced by organizational innovation (Evangelista and Vezzani, 2010).

Given this background, it appears quite evident that marketing and organizational innovation are becoming pivotal for food companies in order to specifically meet consumer preferences, and develop new business practices which allow them to implement successful external relationships aimed at a greater and successful innovation activity. Also, if we go back in the past organization economic literature, we could see that the seminal works of Penrose (1959) and Wernerfelt (1984) already underscored the relevant role played by the firm capacity to organize resources in order to achieve a sustained competitive advantage. Therefore, when talking about innovation, we should consider the whole "picture", taking into account also marketing and organizational innovation, and not only concentrating on R&D activities, which most relate to product and process innovation (Mothe and Nguyen-Thi, 2010). Nevertheless, in the extant literature, there are almost no studies investigating the elements which can affect marketing and organizational innovation and that can be used as indication for managers to improve their non-technological innovations (Geldes et al., 2016). In this regard, the present paper aims to fill this gap by investigating the determinants of both marketing and organizational innovation in two of the largest EU food and drink producers by turnover and value added: Italy and Germany. More in detail, the paper endeavours to address the following research question:

What are the drivers for marketing and organizational innovation in the Italian and German food industry?

The paper is organized as follows: in section 2, the conceptual framework is presented with a detailed explanation of the variables utilized to build the econometric model. Then, the methodology is outlined through a description of the Community Innovation Survey (CIS) database, the drivers for marketing and organizational innovation and the probit model applied. In section 4 the results are discussed, specifically addressing the research question. Finally, we provide some concluding remarks deriving also some managerial implications.

2. Conceptual framework

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Variables from the CIS which seem to have a relationship with marketing and organizational innovation concern three main categories: (i) technological innovations; (ii) knowledge sources; (iii) innovation support activities (tab. 1).

Table 1. Conceptual approach and variables

Categories	CIS codes	Variables
Dependent variables	MKTINN(*)	New or significantly new marketing innovation (as concerns: design/packaging, product promotion, product placement, pricing)
	ORGINN(**)	New or significantly new organizational innovation (as concerns: business practises, methods of organising work responsibilities/ decision making/external relations)
Technological innovations	INPSPD	New or significantly improved methods of manufacturing or producing goods or services introduced
	INPDGD	New or significantly improved goods introduced
Knowledge sources	SENTG	Information from within the enterprise or enterprise group
	SCLI	Information from (private and public) clients/customers
	SCOM	Information from competitors or other companies
	SCON	Information from conferences, trade fairs, exhibitions
	SJOU	Information from scientific journals and trade/technical publications
	SINS	Information from consultants and commercial labs
Innovation support activities	RDSG	Design activities for goods or services
	RTR	Training for innovative activities

(*) This variable is obtained by grouping the following CIS12 variables: MKTDGP, MKTPDP, MKTPDL, MKTPRI.
(**) This variable is obtained by grouping the following CIS12 variables: ORGBUP, ORGWKP, ORGEXR.

Technological innovations are represented by product and process innovations (Geldes et al., 2016; Mothe and Nguyen-Thi, 2012). Previous literature states that their interaction with non-technological innovation is pivotal to improve the propensity to implement future innovation as well as to increase the overall innovation performance (Geldes et al., 2016; Mothe and Nguyen-Thi, 2010). Indeed, technological innovation especially combined with organizational innovation can lead to an improvement of return on sales (Schmidt and Rammer, 2007). In their study on the determinants of non-technological innovation, Schmidt and Rammer (2007) have also found that product and process innovation are positively affecting not only organizational innovation, but also marketing innovation, especially in diversified firms. The more a company diversifies its portfolio introducing new products, the more it will have the necessity to adapt marketing and organizational strategies (Schmidt and Rammer, 2007).

Knowledge sources include the acquisition of know-how, patents, trademarks from other firms or organizations as well as the information coming either from within the company or from external agents such as clients, competitors, conferences and exhibition, scientific journals, consultants. Knowledge affects non-technological innovation, according to the knowledge-based view model which states that "integration of specialist knowledge […] is the essence of organizational capability" (Grant, 1996; p. 377). Indeed, as already asserted by Mothe and Nguyen-Thi (2013) and Ciliberti et al. (2016b), companies are continuously searching for sources of information in order to update and improve their current

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knowledge and/or learn new procedures. Publicly available knowledge (patents, trademarks, etc.) is positively connected to organizational innovation, business practices and workplace organization, whereas information from external agents can be also incorporated into marketing and organizational innovation (Köhler et al., 2012; Mothe and Nguyen-Thi, 2013; Costa et al., 2015), since they can provide insights about new and more efficient organizational arrangements and updates about market trends, consumer preferences, advertising strategies, etc. Acquiring knowledge enables companies to get a better understanding about the market in order to decrease the product failure incidence, which might happen in case of innovative product launches (Wei and Wang, 2011; Avermaete et al., 2004). Moreover, companies successful in innovation are those which not only gather external information, but are also able to merge it with their internal knowledge. Indeed, internal information positively affects organizational innovation, (Mothe and Nguyen-Thi, 2013). Companies should also be able to create new ideas and spread them across their different departments where employees can use them together with insights coming from the outside (Afuah, 2003; Rosenkopf and Nerkar, 2001; Katila, 2002; Lefebvre et al., 2015).

Innovation support activities comprehend those additional actions aimed at facilitating innovation, like designing or altering the shape or appearance of goods, and training the personnel for the development and/or introduction of new products/processes. In order to be innovative, indeed, a connection between design and marketing seems relevant, namely a company should be creative and try to develop new ideas also elaborating new designs for its products (Hsu, 2011). Together with this, training activities, which can be held in-house or contracted outside the firm, have the scope to improve the employees' skills in developing new products gearing customer preferences. Therefore, these support activities enable companies to enhance their marketing innovation capability, because human resources are better skilled in acquiring knowledge (Moreira et al., 2012).

3. Methodology

An econometric analysis is run using microdata of the Community Innovation Survey (CIS) carried out in Italy and Germany in 2012. It is indeed well-known that the CIS is a biennial national data collection survey based on the OECD's Oslo manual and therefore represents an authoritative and widely recognized instrument to investigate innovation and performance by sector and country. In the paper, both the subsamples referred to the Italian and German food industries are used. As concerns Italy, it contains 492 observations (composed by 78% of SMEs and the remaining part of large companies), whereas the German subsample amounts to 327 observations (with 95% of SMEs). It follows that the presence of SMEs is underestimated as concerns Italy, since they usually correspond to more than 99% of food firms in Italy according to Eurostat statistics.

In order to address the research question, variables related to the types of innovation under investigation and to the potential drivers are selected according to the conceptual framework shown in table 1. Moreover, the number of employees is used as control variables, in order to include the size effect on innovation activities. Descriptive statistics of the variables are properly provided in the Appendix (table A).

As both dependent variables are dichotomous, an econometric analysis which takes into account the categorical nature of these variables is chosen (Agresti, 2002). However, as preliminary step, an extension of the probit model (known as the bivariate probit) is tested, in order to test whether the error terms of the two models are correlated. Since the correlation between the error terms of the equations is not significantly different from zero, the separate (univariate) probit estimation is preferable (Greene, 2008). The Probit model has the following specification:

$$MKTINN/ORGINN = \Phi (ß_0 + ß_1\ INPSPD + ß_2\ INPDGD + ß_3\ SENTG + ß_4\ SCLI + ß_5\ SCOM + ß_6\ SCON + ß_7\ SJOU + ß_8\ SINS + ß_9\ RDSG + ß_{10}\ RTR + ß_{11}\ SIZE)$$

A total of four probit models (two for Italy and two for Germany, respectively with MKTINN and ORGINN as dependent variables) are estimated with Stata 12, using the maximum likelihood procedure.

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4. Results and discussion

According to the research question introduced, the strategy of data analysis is articulated in two steps: a) first, the relationships between marketing and organizational innovation and the drivers derived by the conceptual framework is investigated for each country; b) second, the differences between Italy and Germany referred to both types of innovations under analysis are examined.

Table 2 provides marginal effects of the probit models. The estimates of the covariates are listed according to the conceptual framework. Models 1.1 and 1.2 respectively concern marketing and organizational innovation in Italy, whereas models 2.1 and 2.2 regard the same types of innovations for German food companies.

Table 2. Probit marginal effects

	IT		DE	
	Model 1.1	**Model 1.2**	**Model 2.1**	**Model 2.2**
	MKTINN	**ORGINN**	**MKTINN**	**ORGINN**
INPSPD	0.061	0.109 *	0.012	0.106
INPDGD	0.105 *	-0.107 *	0.027	-0.044
SENTG	0.003	0.045 *	-0.040	0.011
SCLI	-0.062	-0.105 *	0.145	0.077
SCOM	0.001	0.073 **	-0.001	0.057 *
SCON	0.054	-0.054	0.013	-0.023
SJOU	-0.052	0.059	0.050	0.058
SINS	0.047 *	0.032	0.012	0.013
RDSG	0.095	-0.056	0.456 ***	0.135
RTR	0.179 **	0.334 ***	0.135 **	0.168 **
SIZE	0.020	-0.006	0.395 **	-0.058
Log pseudolikelihood	-138.738	-150.767	-103.522	-99.937
N. of observations	272	272	232	232
Likelihood Ratio (LR): χ^2 test	36.91 ***	62.19 ***	105.39 ***	82.54 ***
McFadden's pseudo R^2	0.117	0.171	0.337	0.292

*p<0.10; **p<0.05; ***p<0.001

As regards marketing innovation, model 1.1 shows that in the Italian food industry it is positively stimulated by the introduction of new products (INPDGD). It is indeed quite normal that such marketing activities are linked to product innovation activities aimed to improve or introduce goods and/or services, since innovation in product design, packaging and so on allows a better adaptation to consumer preferences (Schmidt and Rammer, 2007; Trienekens et al., 2008). With regard to knowledge sources, only information provided by consultants (SINS) is able to trigger new marketing activities, as well as training for the personnel specifically for the development and/or introduction of innovations (RTR) is the only in-house support activity that increases the probability to carry out marketing innovation. What emerges here is the leading role of information provided by consultants or commercial labs (concerning product placement and promotion) that are incorporated into marketing innovation, since they provide

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updates about market trends and consumer preferences as well reduce product failures (Wei and Wang, 2011; Avermaete et al., 2004). In the meanwhile, a continuous personnel training allows elaborating strategies and concepts for the diffusion of new marketing solutions as also confirmed by Moreira et al. (2012). To sum up, the flow of external information towards food companies aimed to implement marketing innovation is fostered by the acquisition of external services (consultancy) or by organizing in-house or contracted out training events for employees. These activities both directly and indirectly stimulate the adoption of new marketing techniques, on the one hand by triggering the development of new products (and the related need of new promotion and placement strategies) and on the other hand by encouraging the adoption of new solutions for product design, packaging or pricing.

Model 1.2 reveals that technological innovations (i.e. process and product innovations) play dissimilar roles in fostering the implementation of new organizational methods in the Italian food industry. More in details, on the one hand the introduction of new processes (INPSPD) stimulates significant changes in business practises, methods of organising work responsibilities, decision making and/or external relations, but on the other hand the development of new products/services (INPDGD) negatively affect such innovation activities. A possible explanation of these empirical evidences is that the development of new or significantly improved production process stimulates the adoption of new organizational solutions (concerning new business practices, methods of organizing work responsibilities) and pushes to “open” companies’ organizations in order to establish external relations). On the other hand, the introduction of new products/services somehow hinders (at least in the short run) the adoption of innovative methods of organizing procedures and decision making. With concern to knowledge sources, both information from competitors or other companies (SCOM) and from within the enterprise (SENTG) increase the probability to introduce organizational innovations, in contrast to those provided by (private and public) clients/customers (SCLI). This empirical evidence confirms that companies benefit of gathering and merging external knowledge with their internal information (Mothe and Nguyen-Thi, 2013). More in details, results reveals that, whereas information sources from the same business environment (composed by the enterprise itself and rival companies) stimulate the adoption of new internal business practices and/or new methods of organizing external relations, the knowledge derived from clients does not directly affect such activities. It could be the case that the former information is more intelligible, direct and useful in order to change organizational patterns than this taken from the external environment (Mothe and Nguyen-Thi, 2013). Lastly, training activities (RTR) again greatly foster the implementation of new organizational strategies. It appears clear that these activities, aiming at improving the knowledge and the competencies of the employees, strongly contribute to the diffusion of innovations that concern new methods of organization for Italian food companies.

Moving the discussion of results to Germany and starting from marketing innovation, model 2.1 reveals no significant effects of variables related to technological innovations and knowledge sources for food companies. Conversely, innovation support activities such as design activities (RDSG) and training for innovative activities (RTR) are both able to trigger the development of new marketing concepts. Indeed, while on the one hand activities to design or alter the shape or the appearance of goods and services directly and strongly relevantly encourage marketing innovation also according to Hsu (2011), on the other hand also in Germany training plays a key role in arousing the adoption of solutions related to marketing of food products, because better skilled human resources are more able to elaborate new marketing strategies, according to Moreira et al. (2012). Lastly, results also highlight a size effect, meaning that in the German food industry large companies are more likely to introduce such type of innovation than SMEs (Schmidt and Rammer, 2007; Schubert, 2010). This effect could be explained by the fact that company size affects both the need for continuously upgrading form promotion and consequently increases the ability to elaborate and offer reliable and effective response in terms of new marketing concepts or strategies.

Model 2.2 highlights that, differently from Italy, in Germany new organizational strategies of food companies are not influenced by technological innovation activities (such as product and process innovation). Regarding knowledge sources, the only one is showing a positive effect in augmenting the probability to introduce organizational innovation is acquiring information from competitors (SCOM). It

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means therefore that external incentives are useful in order to trigger the development of organizational solutions that are in line with company needs, as already asserted by the well-acknowledged knowledge-based view (Grant, 1996). Moreover, training for innovation (RTR) is proved to be a support activity able to increase the possibility of developing new organizational methods in the German food industry. Indeed, the competencies accumulated by the staff during such events, aiming to improve and update both hard and soft skills, enhancing the ability to adapt company organization to new external and internal needs.

Furthermore, since one of the aims of the present paper is to point out possible significant differences between Germany and Italy food industries as concerns both types of innovation under investigation, two Wald-type tests of smooth nonlinear hypotheses about the estimated parameters of the four models are run. Table 3 reports the results of the above-mentioned tests, respectively concerning marketing (model 1.1 *vis-à-vis* model 2.1) and organizational innovation (model 1.2 *vis-à-vis* model 2.2).

Table 3. Wald- tests of nonlinear hypotheses: IT vs. DE

	MKTINN		**ORGINN**	
	Model 1.1 vs 2.1		**Model 1.2 vs 2.2**	
INPSPD	0.24		0.05	
INPDGD	0.53		0.20	
SENTG	1.03		0.40	
SCLI	3.62	*	2.86	*
SCOM	0		0.00	
SCON	0.39		0.12	
SJOU	2.86	*	0.07	
SINS	0.27		0.06	
RDSG	7.74	**	3.66	*
RTR	13.96	***	34.43	***
SIZE	4.15	**	0.25	

*p<0.10; **p<0.05; ***p<0.001

With regard to marketing innovation, the test shows some significant differences between Italian and German food companies as concerns some knowledge sources (SCLI and SJOU) and both the innovation support activities included in the models (RDSG and RTR). As regards information from clients/customers as well as from scientific journals and technical publications, it must be noted how, in this regard, probit models point out not significant but at least opposite effects (i.e., negative in Italy and positive in Germany) on marketing innovation. As for design activities (RDSG), again a possible explanation of such a difference can be found in the models outputs, since they reveal a positive and strongly significant impact on new marketing strategies in Germany, as opposed to Italy (where no significant, even if positive, effect appears). Concerning training activities (RTR), probit models indicate that these latter activities play a stronger role in Italy than in Germany in order to stimulate the introduction of new marketing solutions. Lastly, the test reveals that also the effect of size on marketing innovation significantly differ between the two countries investigated; in this regard, models highlight that such an effect is indeed relevant only for Germany.

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The Wald test between models 1.2 and 2.2 discloses that, with regard to drivers of organizational innovation, there are some significant differences between Germany and Italy that concern information from clients/customers (SCLI) as well as the role of design (RDSG) and training activities (RTR). More in details, such differences regarding a typical knowledge source and two specific innovation support activities can found a rationale in the probit models. Indeed outcomes highlight that these variables play a negative role in Italy (significant for SCLI but not for RDSG), whereas have a positive (even if not significant) effect on organizational innovation for German food companies. As concerns training (RTR), the significant difference revealed by the Wald-type test stems from the fact that in Italy this activity more effectively promotes organizational innovation than in Germany.

5. Concluding remarks

The present paper aims to fill the gap of knowledge concerning non-technological innovations in the food industry and provides indications for scholars and managers. More in details, thanks to the Italian and German CIS data, some econometric analyses have been run in order to shed lights on the drivers of both marketing and organizational innovation. Furthermore, in order to further exploit the potentiality of the CIS database, a comparative analysis contributes to investigate the differences of the determinants of both these types of innovation between the two largest EU food and drink producers.

To this aim three main categories of potential determinants of marketing and organizational innovation (related to technological innovations, knowledge sources and innovation support activities) were selected. Empirical evidences provided by four probit models confirmed that in Italy – opposed to Germany – product and process innovations affect both organizational and marketing innovation. As concerns knowledge sources, it emerged that especially Italian companies rely on both external and internal information, but while the latter positively affects the adoption of new organizational methods, the former - consultants and competitors - is respectively incorporated into marketing and organizational innovations. German food companies do not seem to particularly benefit of knowledge acquiring other than those from rival firms, in order to develop new organizational solutions. More relevant is the role of support activities such as design and training. In this regard, apart from the connection between the design activity and marketing innovation, which clearly emerged only for German food companies, the role played by training is very relevant for both countries and both types of innovation. Such support activity allows employees to enhance their skills aimed to develop and implement non-technological innovation in the company. Indeed, this support activity enables the company to develop new marketing strategies and to implement innovative organizational methods for external relations, decision making and various business practices (including knowledge management).

Moreover, the comparative analysis gave further insights on divergences between Italy and Germany. What emerged is that information from clients and customers play a different (although not significant) role in the two countries as concerns both types of non-technological innovations in exam. Likewise, knowledge spread by means of scientific journals have different (but again not significant) impact on new marketing strategies. As regards support activities, the tests show that while design activities differently affect marketing and organizational innovation (with more emphasis in Germany than in Italy), conversely the training activity represents a significantly more relevant driver for both types of innovation in Italy.

However, the present paper has some limitations that mainly consist in what follows: i) the number of observations of the most recent CIS wave is restricted; ii) the composition of the subsample over-represents large companies (especially in the Italian sample). So, even though no relevant size-effect was revealed in Italy, results may be somehow biased. To this aim, future researches should address these issues as well as focus on other aspects related to marketing and organizational innovation (such as strategies and obstacles of these activities), extend the analysis to other EU countries or interestingly compare non-technological and technological innovations.

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APPENDIX

Table A. Relative frequency of variables

Variable (CIS code)	Value	ALL IT (n=272)		ALL DE(n= 232)	
		Rel. Freq.	Abs. Freq.	Rel. Freq.	Abs. Freq.
Dependent variables					
MKTINN					
	0	0.265	72	0.599	139
	1	0.735	200	0.401	93
ORGINN					
	0	0.390	106	0.702	163
	1	0.610	166	0.297	69
Covariates					
Technoogical innovations					
INPSPD					
	0	0.379	103	0.763	177
	1	0.621	169	0.237	55
INPDGD					
	0	0.301	82	0.685	159
	1	0.699	190	0.315	73
Knowledge sources					
SENTG					
	0	0.570	155	0.573	133
	1	0.033	9	0.056	13
	2	0.118	32	0.155	36
	3	0.279	76	0.216	50
SCLI					
	0	0.375	102	0.586	136
	1	0.625	170	0.414	96
SCOM					
	0	0.412	112	0.599	139
	1	0.294	80	0.116	27
	2	0.213	58	0.198	46
	3	0.081	22	0.086	20
SCON					
	0	0.279	76	0.595	138
	1	0.298	81	0.142	33
	2	0.331	90	0.207	48
	3	0.092	25	0.056	13
SJOU					
	0	0.397	108	0.638	148
	1	0.313	85	0.155	36
	2	0.221	60	0.159	37
	3	0.070	19	0.047	11
SINS					
	0	0.195	53	0.789	183
	1	0.305	83	0.116	27
	2	0.331	90	0.078	18
	3	0.169	46	0.017	4
In-house support activities					
RDSG					
	0	0.750	204	0.759	176

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	1	0.250	68	0.241	56
RTR					
	0	0.607	165	0.539	125
	1	0.393	107	0.461	107
Control variable					
SIZE					
	0	0.78	212	0.948	220
	1	0.22	60	0.052	12

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