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Unveiling the characteristics of offshoring firms: An empirical study of

Danish firms

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Abstract

As offshoring became more prevalent practice among firms in developed countries, more research has been done on different aspects of offshoring, such as motivation, functions offshored, location and effects on different levels of economy. Recent studies shed light on the evolution of firms' offshoring behaviours and challenge the conventional view on offshoring as relocation of production functions to countries with low wage by highlighting the increasing focus on offshoring of more advanced functions to different locations. However, despite the significant improvement in the understanding of offshoring patterns, there is still lack of understanding of firms conducting offshoring as opposed to firms staying within the national boundary. Some characteristics of offshoring firms such as size, productivity have been identified while studying other attributes of offshoring, but these fail to provide a coherent picture of who the offshoring firms are. This can be quite problematic as offshoring, unlike other forms of globalization, concerns replacing the current jobs in the firms, meaning that firm characteristics might have some explanatory power in understanding the issues around offshoring. The aim of the study is to analyse the characteristics of offshoring firms to enhance the fundamental understanding of the actors of the practice of offshoring. GONE survey data on Danish offshoring firms has been used to identify certain characteristics of offshoring firms. The logistic regression is conducted with two structural characteristics ? Size and Age ? and three qualitative characteristics ? Flexibility, Innovativeness, and Focus on quality ?. The results shows that Size, Age, and Innovativeness have positive association with the propensity to offshore. Moreover, it is proven that the industry and the ownership structure of the firm also explain the likelihood of a firm to relocate activities abroad.

Introduction

Globalization has accelerated significantly in the last 20 years as firms have begun to engage more and more in international operations in the form of import/export, Foreign Direct Investment (FDI) and offshoring. Recently, more attention has been given to offshoring since it became a wide-spread practice among U.S. and European firms. Offshoring is defined in this paper as the relocation of business activities from home country to foreign countries. This definition encompasses activities both internal and external to the firm, which means that different governance modes for the offshored unit are considered. The firms may establish own subsidiaries (captive offshoring) or form joint ventures abroad in relation to offshoring or they could outsource the activities to unaffiliated external suppliers abroad (offshore outsourcing). According to this definition, offshoring deals with both the concept of internationalisation (Dunning, 1980, Buckley and Casson, 2002) and that of outsourcing (Williamson, 2008).

What distinguishes offshoring from other forms of international operation is that it is not driven primarily by market seeking motivation (Lewin and Peeters, 2006). Drawing on the Offshoring Research Network (ORN) data, Lewin and Peeters (2006) found that cost reduction is the number one motivation for offshoring administrative and technical work. Cost saving mainly comes from labour arbitrage, which is why the major offshoring destinations have been countries with relatively low wage level. Although several researchers argue that other motivation factors such as access to qualified workers and specialised knowledge are increasingly becoming important (Maskell et al., 2007, Dossani and Kenney, 2003, Lewin et al., 2009), cost reduction is still the most important driver for offshoring (Statistics Denmark, 2008). Another aspect that distinguishes offshoring from other international operation is that it involves the direct replacement of the existing domestic workers with foreign workers. Roza et al. (2011) emphasizes that offshoring is a relatively new practice of internationalisation, which involves the aspect of replication, transferring competences from one setting to another.

One of the reasons that offshoring is gaining much attention is that the impact of this practice can be manifold and contradictory. The often discussed issue regarding the impact of offshoring is the concern of 'losing jobs' in the home country. Offshoring is often considered as the direct export of jobs to foreign countries, which threatens the growth of the national economy. In the empirical studies, results for the effect of offshoring on domestic employment are inconclusive. Some studies found that offshoring

destroys jobs at home (Brainard and Riker, 1997, Hanson et al., 2003) while other studies showed that it rather creates jobs (Mankiw and Swagel, 2006). Some argue that the impact on job destruction/creation depends on conditions such as destination location and the degree of offshoring (Harrison and McMillan, 2006, Kohler and Wrona, 2010).

Another often studied aspect assumed to be influenced by offshoring is the different performance measures of firms. Results also vary for different measures and different settings. For example, Kotabe and Omura (1989) found that the market performance of products is not positively related to offshore outsourcing. On the other hand, offshore outsourcing is found to be positively related to propensity of innovation (Kotabe, 1990). Mihalache et al. (2012) also showed that to a certain level, offshoring has a positive effect on innovation. However, the inverted U-shaped influence of offshoring indicated that too much offshoring harms the level of innovativeness. Regarding profitability and productivity, some studies found a positive impact of offshoring, but only in the case of offshore outsourcing to developing countries (Jabbour, 2010) and in the case of offshore outsourcing of large firms (Görg and Hanley, 2005). Olsen (2006) in his review of empirical studies on how offshoring influence productivity concludes that there is no clear patterns for the impact of offshoring on productivity in both macro and micro level. Often, the effects are found to be influenced by sector- and firm- specific characteristics.

The fact that the effects are often subjected to firms-specific characteristics implies that it would be beneficial to study whether firms with certain characteristics are more inclined to offshore than others. Taking into account the self-selection of firms will provide a better interpretation of the results on the impact of offshoring. Furthermore, the study on the characteristics of offshoring firms will enhance the understanding of why and how firms implement offshoring practice since the different characteristics of firms can lead to different decision making in the process. It will therefore complement the existing offshoring studies, which investigate the various aspects of offshoring such as motivation (Lewin et al., 2009, Maskell et al., 2007, Kedia and Mukherjee, 2009, Kenney et al., 2009), locations (Hahn and Bunyaratavej, 2010, Jensen and Pedersen, 2011b, Demirbag and Glaister, 2010, Flores and Aguilera, 2007, Dunning, 2009), and activities offshored (Bardhan, 2006, Ambos and Ambos, 2011, Ficarek and Veloso, 2010, Massini and Miozzo, 2012).

Drawing on a firm-level survey data, the paper investigates whether or not offshoring firms have distinctive firm characteristics compared to non-offshoring firms. The conventional structural characteristics such as size, age are studied in relation to the likelihood of offshoring, but the study goes further by adding some qualitative characteristics in the analysis such as focus on quality, focus on

development and innovation, and flexibility. These qualitative characteristics are identified in the survey and provide rather original measures on qualitative features that complement the quantitative characteristics of firms.

The paper is organised as follows. In the next section, a literature review on what, why, and to where firms offshore is presented. In the third section, hypotheses are developed and presented, discussing the literature on offshoring and firm characteristics. The fourth section presents the data and the methodology. The fifth section discusses the results of the empirical analyses, and the discussion and conclusion is derived in the last section.

Offshoring – what, why, and where

The offshoring of manufacturing has long been documented in the international business (IB) literature (see for example, Hymer, 1976, Vernon, 1966). Since 1960s, locational advantages like rich natural resources, low labour costs, and market access have been driving FDI of multinational enterprises. What is relatively new in offshoring is that firms started to offshore not only manufacturing functions but also service functions (Massini and Miozzo, 2012), which has been traditionally considered ‘non-tradable’. Firm’s inclination to offshore service activities captured researchers’ attention, and many studies have been conducted focussing on service offshoring (Liu et al., 2011, Kenney et al., 2009, Bunyaratavej et al., 2011, Hahn et al., 2011b). Moreover, some studies on offshoring began to distinguish offshored activities in another way (standard/advanced) as the simple categorisation of manufacturing and service was not able to explain different offshoring patterns (see for example, Jensen and Pedersen, 2011). This reflects that offshoring today encompasses a wide variety of activities from standardised manufacturing activities to advanced development activities.

What motivates firms to offshore varies, but the most dominant driver has been cost reduction (Lewin and Peeters, 2006). Ferdows (1997) identified three main motivations for manufactures as 1) access to low-cost production, 2) access to skills and knowledge, and 3) proximity to market. These three drivers seem to hold well for offshoring of other activities. Recently, more researchers began to emphasize the importance of knowledge-seeking motivation (Maskell et al., 2007, Lewin et al., 2009, Jensen and Pedersen, 2011) as they observe that firms chose location with relatively high wage level as offshoring destination to get access to specialised labour. It is also observed that two or more drivers combined – accessing relatively cheaper talents – motivate the firms to offshore.

The two destination countries that are mentioned most often in the context of offshoring are India and China. The two countries seem to have specialised in certain areas like manufacturing and assembly, and IT services. Although China and India attract many offshore projects worldwide, the offshore locations are not constrained to these two countries, and often the choice depends on various factors such as the motivation and the activity. Han et al. (2011) showed that firms that are offshoring service tend to offshore to countries with lower wage than home country and the discounted wage influence the attractiveness of the location more for lower skill service than high skill service. They also find that geographical distance matters as discounted wage has a weaker influence on nearshore locations than farshore locations. This explains US firms' frequent offshoring to Mexico and Canada and European firms' offshoring to East European countries. Jensen and Pedersen (2011) assert that to understand firm's location choice, the nature of offshored activities should be taken into account. Whether the firm offshores standardised activity or advanced activity matters for where the firm decides to offshore. All in all, the nature of the implementation of offshoring needs to match the attributes of the location.

Offshoring and firm characteristics

Structural characteristics

Size

In International Business literature, internationalisation has mainly been associated with large companies as earlier studies on internationalisation focused on large multinational enterprises (MNEs). Many argued that small- and medium-sized enterprises (SMEs) are constrained from international activities due to the lack of financial, managerial, and informational resources (see for example, Buckley, 1989). On the other hand, some authors argued that size is not a barrier for internationalisation (Calof, 1994) as resource constraints can be overcome in various ways (Coviello and McAuley, 1999). Some empirical studies showed how SMEs found unique ways to overcome the constraints (Bonaccorsi, 1992, Gomes-Casseres, 1997).

Firm size is also a controversial issue in terms of outsourcing. The literature on core competence would suggest that small firms are more likely to offshore as they can use scarce resources to the core activities while outsourcing other activities. For the activities requiring the economies of scale, smaller firms will be more motivated to outsource than large firms (Merino and Rodríguez, 2007). The outsourcing suppliers have a better chance at matching the level of economies of scale of large firms by supplying to multiple customers. The counter argument could be that large firms are motivated to use

subcontractors in order to reduce costs by enhancing flexibility in production (see for example, Kimura, 2002). Large firms are also more likely to have higher wage, which is related to the likelihood of outsourcing (Girma and Görg, 2004). In the case of international sourcing, large firms will be more inclined to outsource than SMEs as they are likely to have a broader presence in the international market, which increases the probability of international sourcing.

In short, firm size might have different underlying effects for the likelihood of offshoring of a firm according to the internationalisation literature and the outsourcing literature. An empirical study on offshoring also indicated that size is not related to the propensity to offshore (Jensen and Pedersen, 2007). However, offshoring as it is defined in the paper requires that the firm has a considerable employee base before it can relocate activities abroad. Therefore, the following hypothesis is developed.

H1: Firm size is positively related to the likelihood of a firm to offshore.

Age

The traditional process view of internationalisation suggested that internationalisation is an incremental process, which increases with firm's life cycle (Bilkey and Tesar, 1977, Johanson and Vahlne, 1990, Eriksson et al., 1997). Johanson and Vahlne (1990) argued that as firms acquire more knowledge of foreign markets and operations, they increase the commitment of resources to foreign markets. Firms will start out by having no international activities and gradually move into exporting. Then, as experience and knowledge accumulates from exporting, firms will start establishing sales subsidiaries and later on manufacturing facilities. Following this line of argument, it can be assumed that getting to the stage of relocating activities will take time from the foundation of firms.

Opposing to this view, another stream of research in international business literature started to raise attention to small and new entrepreneurial firms that engage in international activities from the very beginning of the firm establishment (McDougall et al., 1994, Knight and Cavusgil, 2004). These firms are named differently from "Born Global" to "International new venture" to name a few. Some empirical studies challenged the process view of internationalisation and proved that some firms do not need to accumulate knowledge over time and the age is not related to the degree of internationalisation (Rialp et al., 2005, Moen and Servais, 2002). Weerawardena et al. (2007) explain that dynamic capabilities nurtured by the founder prior to the establishment of the venture allow the firm to develop cutting-edge knowledge intensive products, which contribute to the acceleration of internationalisation. Considering these "Born Global" firms, firm age may not matter for the propensity of firms to offshore.

Yet, considering the unique characteristic of offshoring –replication of activities–, the firm needs to be ‘established’ in a sense that it possesses some routines and processes that can be considered for relocation. Offshoring entails the decision of whether the firm wants to keep the current activities at home or move these to foreign locations. Following transaction cost theory (Coase, 2007, Williamson, 1981), the firm will have to decide which option is more economically beneficial for the organisation. In order to make such a decision, the firm needs to have established routine and processes that they can consider for offshoring. Establishing routines and process will take time and therefore the following hypothesis is developed.

H2: Firm age is positively related to the likelihood of a firm to offshore.

Qualitative characteristics

Flexibility

Firms are frequently exposed to changes in the market and the industry. In order to survive in the ever-changing business environment, firms need to be flexible and adapt to these changes faster than the competitors. Flexibility requires efficient coordination throughout the firm’s operation. However, offshoring interferes with efficient coordination as the international aspect of offshoring entails increased distance between the functions remaining at home and the offshored function abroad. Increasing distance makes coordination harder by influencing interactive learning and knowledge transfer. According to Boschma (2005), geographical distance influences interactive learning and knowledge transfer by affecting other types of distance (or proximity): institutional distance, cognitive distance organisational distance, and social distance.

In outsourcing literature, flexibility is found to be an important criterion when firms make outsourcing decision (Quélin and Duhamel, 2003). In a way, firms can increase flexibility by outsourcing. Fine-slicing firm’s activities in the value chain and placing them in dispersed geographic areas suggested by Mudambi (2008) can increase the flexibility of operation as the company is able to choose the best suppliers in the market. On the other hand, outsourcing can limit the flexibility of a firm due to the limitation to change the extent, scope and nature of the services or goods that are provided by the suppliers (Tan and Sia, 2006).

All in all, it is assumed in the paper that the firms that have offshored will have less flexibility than non-offshoring firms *ceteris paribus*.

H3: Flexibility as a firm characteristic is negatively related to the likelihood of a firm to offshore.

Innovativeness

Some researchers argue that firms are able to focus on their core, strategic activities while outsourcing more generic activities (Jacobides and Winter, 2005, Dess et al., 1995). Jacobides and Winter (2005) contend that activities like data handling, customer relation management, information processing and call centre are all generic across different sectors and therefore can be contracted to external suppliers without much harm. Companies can then utilise their resources in the areas where they have competitive advantages. Similarly, offshoring firms are likely to offshore non-core activities while increasing their commitment to core activities such as research and development. For the firms offshoring with cost reduction motivation, this is likely the rationale behind the implementation of offshoring as they can invest more on innovative activities due to the cost saving through offshoring. There are also firms that are offshoring with knowledge seeking motivation. In this case, the firms are likely to have strategic focus on development and innovation. Therefore, the following hypothesis is developed regarding the relation between innovativeness and the likelihood of a firm to offshore.

H4: Innovativeness as a firm characteristic is positively related to the likelihood of a firm to offshore

Focus on quality

The media often reports defective products produced in offshore production sites (see for example, Story, 2007), and this seems to create an image of products and services from offshoring as being of low quality. The ORN survey on business process offshoring also revealed that 'achieving expected quality' was the highest rated risk associated with offshoring by the respondents (Lewin and Peeters, 2006).

By investigating 30 pairs of offshored manufacturing unit and manufacturing unit at home, Gray et al. (2011) found that the quality risk was indeed higher in the offshored unit. The authors suggest that inefficient internal knowledge transfer, the low level of the general skills of the employees, and the low level of the industry-specific skills of the employees might have caused higher quality risk in offshored units, while they only found empirical support for the effect of poor intra-firm knowledge transfer. The result shows that geographic and cultural distance interferes with efficient knowledge transfer between the firm in the home country and the offshored unit, which makes the quality control harder. Although insignificant in their study, the skill level of employees in the offshored unit may have implication for the quality problem. The skill level can be reflected through the general education level of population and

the agglomeration of certain industries in the offshore destination. It is likely to be lower in the offshoring destination than in the country of origin, considering that the popular offshore destinations are mostly developing countries. Taking into account the result of the study by Gray et al. (2011) and the current association of offshoring with low quality, it is assumed that firms focussing on quality will be less likely to engage in offshoring.

H5: Focus on quality as a firm characteristic is negatively related to the likelihood of a firm to offshore.

Data

The analysis in this paper is based on the GONE (Global Operation Networks) survey conducted in Denmark in 2011. In the survey, firms in diverse sectors were asked to answer questions regarding their offshoring experience anonymously. The survey was sent out to 2900 Danish firms, 675 of which came back with responses, resulting in 23 percent response rate. After sorting out the cases with missing values for the variables used in the analysis, our sample consists of 552 firms with 50 or more employees in various sectors (see Table 1)¹.

Table 1 Sample descriptive statistics

		Count	%
Size (domestic employees)	Medium 50-99	263	48%
	Large 100+	289	52%
	Total	552	100.0%
Industries	Manufacturing of machinery and equipment	79	14.3%
	Manufacturing of other goods	79	14.3%
	Trade	107	19.4%
	Transport	45	8.2%
	Information and communication	52	9.4%
	Financial and insurance	32	5.8%
	Construction and utility services	53	9.6%
	Other business services	70	12.7%
	Other industries	35	6.3%

¹ The sample is overrepresented by large firms in manufacturing, and trade and transport sector. The descriptive findings should be interpreted with caution as our sample is biased towards firms that are more likely to offshore.

Total	552	100.0%
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The survey asks specifically about the relocation of functions from Denmark to foreign countries, allowing more precise measure for offshoring activities compared to other data sources commonly used in offshoring research (e.g. FDI data). The questionnaire was roughly divided into three parts. The first part deals with general company descriptions such as the number of employees, the number of countries that the company is present in, and the ownership. The second part inquires about the overall offshoring experience including the first year of offshoring, the first country of destination, governance mode, and the effects of offshoring among others. In the last part of the survey, the respondents were asked to give more detailed information on the last implementation of offshoring. Besides the same questions asked for the overall experience, questions on the types of functions, unexpected challenges, and the coordination mechanisms for offshored functions were added. What distinguishes this dataset other offshoring data is the detailed information on the qualitative characteristics of the firm and the offshoring activities. The respondents rated the firm and the offshored functions in terms of some qualitative characteristics (see Table 2 for the characteristics of the offshored activities), which enhances the understanding of the firms and the functions involved in offshoring.

Table 2 The characteristics of the offshored activities

	N	Minimum	Maximum	Mean	Std. Deviation
Simple and routinized	185	1	7	3.79	1.757
Labour intensive	185	1	7	4.14	1.636
Independent from the company's other activities	185	1	7	4.01	1.712
Integrated with the company's other activities	186	1	7	4.65	1.786
Standardized	183	1	7	3.91	1.564
Creative and innovative	183	1	7	3.28	1.676
Many sub-processes	183	1	7	4.30	1.580
Clear and logical work division	181	1	7	4.98	1.398
Requires high knowledge content	183	1	7	4.33	1.659

Valid N (listwise)	177			
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Offshoring patterns of Danish firms

Functions offshored

According to the survey, 39 percent of the respondents in our sample have offshored at least one function abroad in the past. Among these offshoring firms, 191 firms gave more detailed information about their last implementation. In this part of the survey, the offshored functions were initially divided into three categories: production, service/administration, and design/development. Then, the three functions were classified into sub-functions as can be seen in the table 3. The production functions are the most commonly offshored functions among Danish firms as more than half of the firms offshored production functions in their last implementation. Among the detailed sub-functions, manufacture accounted for more than 70 percent of the cases. Regarding service functions, more than one fourth of the firms relocated these functions in their last offshoring implementation. The implementation of sub-functions of service is more evenly distributed than that of production sub-functions, with IT services being the most popular service sub-function to be offshored. In spite of the recent attention towards ‘innovation offshoring’ in the literature (Couto et al., 2007), development (innovative) functions are not offshored as much as other functions. Among development sub-functions, software development is the dominant sub-function to be offshored, accounting for almost 60 percent of the development function offshore.

Table 3 The distribution of the functions in the last implementation

Functions	Count	%
Production	101	53%
Production technology	4	4.0%
Production preparation	2	2.0%
Manufacture	74	73.3%
Assembly	13	12.9%
Test and Quality management	1	1.0%
Maintenance	2	2.0%

Other	5	5.0%
Service/Administration	52	26%
Finance/Accounting	10	19.6%
HR	0	0.0%
Marketing and sales	7	13.7%
IT	12	23.5%
Call center/Customer service	3	5.9%
Procurement and supply management	3	5.9%
Logistics	8	15.7%
Legal services	0	0.0%
After sale support	2	3.9%
Other	6	11.8%
Design/Development	38	21%
Research	0	0.0%
Product design	4	10.5%
Product development	8	21.1%
Software development	23	60.5%
Other	3	7.9%

Offshore location

Popular offshoring locations for Danish firms do not differ from the conventional destination countries mentioned in the literature (Massini and Miozzo, 2012). The three most popular countries are China and India, Poland, followed by Germany (see Table 4). Besides these four countries, Thailand, USA, two east European countries – Ukraine and Czech Republic–, and two neighboring countries – Sweden and Norway – are the countries that often host offshoring units of Danish firms. When dividing the country distribution by functions, a clear division is observed between production and service functions (see Table 5). While China is dominant in hosting production functions, it is not in the 5th most popular country for service functions. For service functions, India and neighboring European countries are the most popular ones. It seems that geographical proximity is an important factor for location choices for service offshoring as the four countries except India are European countries. Germany and Norway, despite their relative high wage levels, ranked high as service offshoring location. On the other hand, all of the 5 most popular destination locations for development functions are developing economies, which

implies that the offshoring of innovative activities is primarily driven by cost advantage rather than the need to get access to specialized labor.

Table 4 The 10 most popular destination countries of the last implementation

Country	Count	%
China	21	15.4%
India	14	10.3%
Poland	14	10.3%
Germany	12	8.8%
Thailand	8	5.9%
Ukraine	5	3.7%
Czech Republic	5	3.7%
USA	5	3.7%
Sweden	4	2.9%
Norway	4	2.9%

Table 5 Destination countries divided by functions

Production

Country	Count	%
China	14	20.0%
Poland	10	14.3%
Thailand	8	11.4%
Germany	4	5.7%
Sweden	3	4.3%

Service/administration

Country	Count	%
India	8	21.1%
Germany	7	18.4%
Norway	4	10.5%
Poland	3	7.9%

Czech Republic	2	5.3%
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Design/development

Country	Count	%
China	5	17.9%
India	5	17.9%
Ukraine	3	10.7%
Vietnam	2	7.1%
Malaysia	2	7.1%

Ownership and establishment of the offshored unit

Among the offshoring firms, about 60% of the firms offshored to their own subsidiary abroad whereas 31% offshored to independent suppliers (see table 6). This shows that captive offshoring is more common than offshore outsourcing when Danish companies relocate their functions. Only a small fraction of the firms offshored to joint venture. About 68% of the firms that offshored to subsidiary have moved the function to already existing units abroad, which implies that the current international presence of the firm might influence offshoring choice in relation to location.

Table 6 The ownership of the offshored unit

	Newly established unit	Existing unit	Do not know	Total
Subsidiary	34	74	1	109
Independent supplier	3	53	1	57
Joint venture	5	12	0	17
Total	42	139	2	183

The econometric model and variables

To enhance the understanding of the firms that offshore, a logistic regression is conducted with offshoring experience as the dependent variable. If the firm had offshored at least one function abroad in the past, the variable takes the value of 1, and otherwise, the value of 0. This variable is obtained from the GONE survey, in which the firms answered whether or not the firm has relocated functions from Denmark to foreign countries. This is a rather direct measure for offshoring experience, following the definition of the offshoring in this paper.

The first two explanatory variables, *Firm size* and *Firm age* represent structural firm characteristics. *Firm size* is the logarithm of the number of employees that company has worldwide in 2011. . Firm’s employment worldwide is used instead of domestic employment since the firms that have offshored will inevitably have less domestic employees after the implementation of offshoring and the employment worldwide is a good indicator for the total size of the work force. The number of employees worldwide is acquired from the GONE survey. *Firm age* is the logarithm of the years that the firm has existed since the establishment and it is obtained from the company register database.

The next three explanatory variables represent the qualitative characteristics of firms identified in the GONE survey. On a 7-point Likert scale, firms were asked to answer to what extent the firm is characterised by the following features: 1) Low operation costs compared to the competitors, 2) Use of the latest technology, 3) Focus on quality, 4) Reactive to changes, 5) Focus on a niche product, 6) Highly adaptive products/services, 7) High service content, 8) Focus on branding, and 9) Focus on development and innovation. Some characteristics were found to be correlated with each other (see table 7), and therefore, principal component analysis was done to reduce the number of variables.

Table 7 The characteristics of firms

	Minimum	Maximum	Mean	Std. Deviation
Low operation costs compared to competitors	1	7	3.81	1.514
Use of the latest technologies	1	7	4.47	1.409
Focus on quality	1	7	5.98	1.046
Reactive to changes	1	7	5.72	1.165
Focus on a niche product	1	7	4.63	1.798
Highly adaptive products/services	1	7	5.41	1.227
High service content	1	7	5.70	1.285
Branding	1	7	5.32	1.482
Development and Innovation	1	7	5.11	1.352

Table 8 Correlation matrix for the characteristics of firms

	1)	2)	3)	4)	5)	6)	7)	8)	9)
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1) Low operation costs	1								
2) Latest technologies	.164**	1							
3) Focus on quality	.028	.272**	1						
4) Reactive to change	.108*	.211**	.464**	1					
5) Niche product	.112*	.130**	.194**	.205**	1				
6) Adaptive products	.107*	.097*	.254**	.506**	.282**	1			
7) High service content	.101*	.157**	.373**	.339**	.098*	.388**	1		
8) Branding	.021	.033	.244**	.106*	.132**	.170**	.247**	1	
9) Innovation	.010	.455**	.342**	.232**	.242**	.254**	.232**	.352**	1

*, **: Correlation is significant at the 0.05 and 0.01 level respectively.

The iteration of the principal component analysis showed that 2 components can be extracted from the following four characteristics: Reactive to change, Highly adaptive products/services, Use of the latest technology, and Focus on development and innovation. The results from the principal component analysis are shown in table 8 and 9. Component 1 and 2 have the eigenvalues over 1, and the two components in total explain 74% of the variance in the four variables.

Table 9 Principal component analysis

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	1.889	47.213	47.213
2	1.081	27.016	74.229
3	.568	14.191	88.419
4	.463	11.581	100.000

Table 10 The coefficient of the two components

	Component	
	1	2
Adaptive products/services	.873	.081
Reactive to changes	.844	.157
Latest technologies	.051	.868

Development and Innovation	.190	.820
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Interpreting the coefficients of the analysis in table 9, component 1 is associated with 1) Highly adaptive products and services and 2) Reactive to changes while component 2 is associated with 1) Use of the latest technologies and 2) Focus on development and innovation. The two components are named *Flexibility* and *Innovativeness* respectively and used as explanatory variables in the logistic regression. Out of the 5 characteristics that were not included in the principal component analysis, *Focus on quality* is used by itself to check for the association of focus on quality with the propensity to offshore.

Furthermore, two additional independent variables are included in the regression as control variables. The first control variable indicates which industries the firms belong to. The firms in the survey are classified into 9 industries: 1) Manufacturing of machinery and equipment, 2) Manufacturing of other goods, 3) Trade, 4) Transport, 5) Information and communication, 6) Financial and insurance, 7) Construction and utility services, 8) Other business services, and 9) Other industries. This information is obtained from the public business register data. Since production functions have been the most common function to offshore historically, manufacturing firms are expected to have relocated functions to foreign countries more than service firms. Service activities have been assumed to be less ‘tradable’ than manufacturing activities, but recently this view has changed along with the technological advances that allow easy transfer of service goods. Yet, service industries in which human interaction is crucial are less likely to offshore (Blinder, 2006). Similarly, industries with service and products that are bound to certain geographic locations are less likely to offshore.

The next control variable is a categorical variable indicating the corporation type. The firms in the survey are divided into four categories in terms of corporate type: 1) Parent company of a Danish group, 2) Subsidiary of a Danish group, 3) Subsidiary of a foreign group, and 4) Not part of a group. The firms that are not part of a group are expected to be less likely to offshore compared to the firms that are part of a group. This is because business groups are well established firms that are more likely to have a rather concrete strategy for internationalisation and the firms are likely to be affected by an overall offshoring strategy of a group that they are part of. Parent companies are expected to offshore more than subsidiaries as they are often the decision makers for internationalisation of the whole group and are often the units that implement the offshoring for the group. It could also be that parent firms try offshoring before the daughter companies to gain experience before they consider the option for the

business group. On the one hand, the subsidiaries of foreign groups could be less likely to offshore as they may already be the offshored unit of a foreign company. On the other hand, as a part of already internationalised firms, the foreign subsidiaries might have more international contacts, which may ease and thus encourage offshoring process. In this paper, it is expected that the subsidiaries of foreign groups are more likely to offshore than the firm that are not part of a group.

The list of explanatory variables and the predicted signs are presented in table 10.

Table 11 The description of variables and the predicted signs

	Description	Predicted sign
Explanatory variables		
Firm size	The logarithm of the number of employees worldwide	+
Firm age	The logarithm of the number of years since firm establishment	+
Flexibility	The firm has highly adaptive products and service and is reactive to changes	-
Innovativeness	The firm constantly uses the latest technologies and focuses on development and innovation	+
Focus on quality	The firm focuses on quality	-
Control variables		
Corporate type	Not part of a group	Reference
	Parent company of a Danish group	+
	Subsidiary of a Danish group	+
	Subsidiary of a foreign group	+
Industry	Manufacturing of machinery and equipment	Reference
	Manufacturing of other goods	-
	Trade	-
	Transport	-
	Information and communication	-
	Financial and insurance	-
	Construction and utility services	-
	Other business services	-
	Other industries	-

Results

The correlation matrix of the explanatory is shown in table 12. The correlation coefficients show that most correlations are low. Table 13 summarises the results of the logistic regression of offshoring experience. Model 1 specifies the base model with control variables on industry and ownership. In the model 2-6, each of the explanatory variables is tested independently, and all the variables are included in the model 7. All models are significant at 0.001 level.

According to the results, the structural characteristics of firms are associated with the likelihood of offshoring in the predicted manner. Hypothesis 1 predicted that bigger firms are more likely to have offshored at least one function in the past. As can be seen in Table 13, this prediction is supported. The coefficient has the predicted (positive) sign and significant at 1% level in both model 2 and model 7. In terms of age, the result shows that the propensity of a firm to offshore is positively related to age, supporting the hypothesis 2. Both coefficients in model 3 and 7 are positive and significant.

The qualitative characteristics showed mixed results. In model 4, it is shown that flexibility is negatively related to the likelihood of a firm to offshore. The coefficient sign is negative and significant at 10% confidence level. This means that flexible firms are not likely to offshore, which supports the hypothesis 3. However, when all the other variables are included in the model 7, the coefficient is not significant any more, although it still has the right sign. Innovativeness is found to be positively related to the likelihood of offshoring as it was predicted. The coefficient is positive and significant in both model 5 and 7, though the significant level is lower in model 7. Lastly, focus on quality is not found be associated with the propensity of a firm to offshore. While the coefficients have the predicted negative sign, they are not significant in any models.

Control variables indicating industry and ownership are found be significant throughout the models. Firms in the industry of Manufacturing of machinery and equipment are more likely to offshore than firms in any other industries in Denmark. Most of the coefficients are significant at 1% level in all models. The odd ratios are significantly lower in the industries that are geographically bound, such as Construction and utility services and Transport. Regarding the ownership, firms in the category of Parent company of a Danish group and Subsidiary of a foreign group are more likely to offshore than firms that are not owned by a group. The coefficients are positive and significant at 1% level in all models. However, the prediction that subsidiaries of Danish groups are more likely to offshore than firms that are not part of a group is not supported in any of the models.

Table 12 Correlation matrix

	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)
1) Other manufacturing	1.000															
2) Trade	.544	1.000														
3) Transport	.411	.431	1.000													
4) ICT	.451	.486	.365	1.000												
5) Financial and insurance	.396	.419	.310	.348	1.000											
6) Construction and utility	.284	.286	.225	.244	.208	1.000										
7) Other business service	.486	.512	.400	.453	.362	.278	1.000									
8) Other industries	.388	.408	.329	.354	.296	.228	.404	1.000								
9) Parent DK	.042	-.006	.006	.052	-.011	.067	.019	.021	1.000							
10) Subsidiary DK	.065	.076	.050	.057	.051	.033	.086	.079	.414	1.000						
11) Subsidiary Foreign	.021	-.077	-.030	-.054	.004	.082	.004	.038	.564	.377	1.000					
12) Firm size	-.055	-.062	-.075	-.125	-.131	-.057	-.053	-.154	-.186	-.085	-.385	1.000				
13) Firm age	.023	.044	.106	.139	-.008	.104	.260	.226	.004	.046	.098	-.104	1.000			
14) Flexibility	-.036	.037	-.012	.001	.023	-.004	.053	-.004	-.024	-.002	-.046	.120	.047	1.000		
15) Innovativeness	.003	.041	.025	-.086	.009	.047	-.012	.076	.123	.014	.067	-.047	.097	.119	1.000	
16) Focus on quality	.023	.044	-.038	.124	.030	-.025	-.016	-.078	-.020	-.021	-.055	-.044	-.128	-.415	-.379	1.000

Table 13 Logistic regression, dependent variable: offshoring experience

	Model1		Model2		Model3		Model 4		Model 5		Model 6		Model 7	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Manufacturing M&E														
Other manufacturing	-.740 **	(.344)	-.813 **	(.350)	-.719 **	(.346)	-.718 **	(.347)	-.732 **	(.346)	-.742 **	(.344)	-.759 **	(.355)
Trade	-1.592 ***	(.334)	-1.659 ***	(.342)	-1.545 ***	(.336)	-1.647 ***	(.337)	-1.542 ***	(.337)	-1.606 ***	(.335)	-1.606 ***	(.349)
Transport	-2.038 ***	(.441)	-2.106 ***	(.454)	-1.899 ***	(.444)	-2.005 ***	(.444)	-2.013 ***	(.441)	-2.032 ***	(.441)	-1.931 ***	(.463)
ICT	-1.038 ***	(.393)	-1.294 ***	(.414)	-.867 **	(.398)	-1.100 ***	(.398)	-1.085 ***	(.396)	-1.064 ***	(.397)	-1.256 ***	(.428)
Financial and insurance	-1.268 ***	(.451)	-1.595 ***	(.477)	-1.279 ***	(.452)	-1.328 ***	(.455)	-1.246 ***	(.454)	-1.277 ***	(.451)	-1.597 ***	(.479)
Construction and utility	-3.202 ***	(.650)	-3.277 ***	(.659)	-3.029 ***	(.654)	-3.186 ***	(.651)	-3.14 ***	(.652)	-3.202 ***	(.651)	-3.033 ***	(.665)
Other business service	-1.460 ***	(.365)	-1.480 ***	(.372)	-1.173 ***	(.379)	-1.494 ***	(.368)	-1.476 ***	(.367)	-1.465 ***	(.365)	-1.286 ***	(.392)
Other industries	-1.733 ***	(.465)	-2.007 ***	(.485)	-1.450 ***	(.477)	-1.701 ***	(.466)	-1.698 ***	(.466)	-1.722 ***	(.465)	-1.664 ***	(.499)
Not in a group														
Parent DK	1.072 ***	(.254)	0.775 ***	(.264)	1.040 ***	(.256)	1.071 ***	(.255)	1.118 ***	(.256)	1.071 ***	(.254)	.824 ***	(.269)
Subsidiary DK	0.371	(.361)	0.202	(.371)	0.398	(.364)	0.369	(.362)	0.368	(.361)	0.374	(.361)	0.243	(.374)
Subsidiary Foreign	1.531 ***	(.272)	0.817 ***	(.303)	1.560 ***	(.275)	1.541 ***	(.274)	1.526 ***	(.272)	1.540 ***	(.273)	0.923 ***	(.309)
Firm size			0.340 ***	(.060)									0.305 ***	(.062)
Firm Age					0.320 ***	(.115)							0.251 **	(.121)
Flexibility							-0.252 *	(.098)					-0.145	(.113)
Innovativeness									0.200 **	(.101)			0.199 *	(.115)
Focus on quality											-0.049	(.092)	-0.088	(.113)
Constant	0.014	(.303)	.340 ***	(.060)	-1.164 **	(.522)	0.030	(.304)	-0.016	(.305)	0.307	(.630)	-1.796 **	(.839)
Cox & Snell R Square	.184		.236		.196		.194		.190		.185		.249	
-2 Log likelihood	627.5		591.42		619.47		620.79		623.54		627.22		581.51	
Observation	552		552		552		552		552		552		552	

*, **, ***: Significant at the 10%, 5%, 1% level respectively

Discussion and conclusion

Utilising the detailed offshoring survey data from Denmark, this paper attempts to identify certain characteristics of firms that are associated with the propensity to offshore. Offshoring is defined as relocation of activities from home country to foreign countries regardless of the governance mode for the offshored activities, emphasising the aspect of replacing domestic workforce with foreign workforce. The logistic regression analysis showed that as firms are older, bigger, and more innovative, they are more likely to offshore activities abroad. Moreover, it is proven that the industry and the ownership structure of the firm also explain the likelihood of a firm to relocate activities abroad.

The finding on the association of firm size and age to the likelihood of offshoring shows that offshoring is likely to be conducted when the firm is somewhat 'established.' This contrasts to the findings in the recent internationalisation literature focussing on 'Born global' firms (McDougal et al., 1994; Knight and Cavusgil, 2004). These firms are found to be engaged in international activities from the very early years of their establishment. The explanation could be that the international activities discussed in this stream of literature are mainly related to export and FDI, which are of quite different character than offshoring. As explained earlier, offshoring brings about the decision on where to locate the activities according to the transaction cost, and to make the decision, the firm needs to have established routines and processes in their activities. Moreover, the transaction costs for offshoring are perhaps smaller once the activity to be offshored is standardized and routinized, which takes time to develop.

Innovativeness is an interesting topic to discuss in relation to offshoring as innovation is often regarded as a way to stay competitive in the current era of globalisation. Being able to offshore means that there are suppliers in other locations that can deliver the similar products and services cheaper. Therefore, in order to be able to compete, the firms need to develop better products and services by focussing on innovation. Therefore, the rationale behind offshoring in developed countries has been that the threat of the 'foreign firms (workers)' can be overcome as long as domestic firms continue to innovate. The fact that innovative firms are more likely to offshore might indicate that the firms are offshoring less advanced tasks abroad while keeping the complex innovation activities abroad. However, if the more innovative firms are offshoring innovation-related activities (Lewin et al., 2009), it may in a long run threaten the competitive advantage of these firms, as the offshore locations get the change to upgrade their competences through 'learning' (Iammarino et al., 2008). The more detailed investigation of offshoring by innovative firms will shed light on how big a threat offshoring will be as many believe so.

In dealing with the effect of offshoring on domestic job destruction, the industry and the ownership categories can be quite useful. Considering that offshoring is inescapable for a firm to be competitive in the global market, the short-term direct job destruction can be considered a strategic 'loss.' What the offshoring nations can then do is to prepare to re-educate the workers in advance so that they can have smooth transition to the new job. For example, the finding in this study showed that firms in the manufacturing sector (especially the manufacturing of machinery and equipment) are more likely to offshore than other industries. The type of the skills needed in this industry can be transformed into the competences that are required in other industries that are less likely to offshore.

The job destruction by offshoring might not be as serious as it is perceived to be cost savings can be reinvested to create jobs elsewhere (Agrawal and Farrell, 2003). As offshoring firms are likely to be older, bigger and more innovative, they may have capabilities to invest the resources gained from the cost advantage of offshoring in their 'core competences' or in new entrepreneurial projects, and thus contribute to job creation through offshoring.

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