R&D MANAGEMENT

Governance choice misfit and firm performance in offshoring innovation: the role of institutional environment

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In this paper, we analyse the effect of institutional factors on the relationship between governance choices and business outcomes when offshoring innovation. Grounded in an institutional theory perspective, we use survey data from the ORN database to estimate regression models and identify governance modes related to specific drivers of offshore innovation. We then analyse the effect on firm performance of choosing a governance mode not in line with the one predicted by the model. We find that choosing a fully owned offshoring operation when theory would predict selecting offshore outsourcing has a negative effect on performance, but not vice versa. We also find that institutional factors of rule of law and IPR protection strength in host countries negatively affect firm performance when offshoring innovation activities.

1. Introduction

Over the past years, multinational companies have adopted two main governance modes to manage their innovation activities overseas: fully owned and outsourcing. Adopting the appropriate governance mode[1] in innovation offshoring helps mitigate possible knowledge leakage and allows utilizing strategic resources in host countries or suppliers' R&D resources to create competitive advantages (Kedia and Mukherjee, 2009; Manning, 2014). Innovation activities play a strategic role in management and have been increasingly offshored over time. Most research regarding offshoring governance choices has focused on manufacturing and general business services, with only a few studies focus on offshoring innovation activities (Leiblein and Miller, 2003; Hutzschenreuter et al., 2011). Research has also highlighted that firms select their governance modes to maximize their performance, although there is relatively scarce research on the relationship between governance choice and firm performance (Shaver, 1998; Brouthers, 2002; Luo et al., 2013; Manning, 2014). Therefore, it is important to identify the drivers of specific governance choices, which in turn can explain firm performance, and not limiting to the governance modes in themselves, and especially identifying the impact of selecting a governance mode which is different from the one predicted by theory (Leiblein et al., 2002; Elia et al., 2014).

Factors related to Transaction Cost Economics (TCE) and the Resource-Based-View (RBV) are

often used to study offshoring governance choices (Brouthers et al., 2008; Argyres and Zenger, 2012; Schneider et al., 2013). If a firm's chosen governance mode is different from the governance predicted by these theories, it will result in a governance misalignment, i.e., choosing a captive mode when the theory-based model predicts outsourcing, or selecting outsourcing when the theory-based model predicts selecting captive. Previous studies have shown that firms enjoy better performance if their chosen governance mode is consistent with the one predicted by established theories (Brouthers, 2002). Some studies have highlighted the role of governance misalignment for offshoring manufacturing and business services, and its impact on firm performance based on the of transaction cost elements, and/or referring to the institutional, cultural, local context (Brouthers, 2002; Leiblein et al., 2002; Elia et al., 2014).

While the role of TCE and RBV on offshoring innovation has been well established in the literature (Roza et al., 2011; Caniato et al., 2015; Rodgers et al., 2019), to our knowledge, no study has investigated the effect of governance choice misalignment, that is, the effect of selecting a governance mode different to the one predicted by theory, on offshoring innovation activities and performance. Considering that innovation is at the core of a firm's competitive advantage and an increasing amount of innovation activities are offshored to low-cost countries with different institutional environments, studying the role of institutional factors on innovation offshoring constitutes an interesting research avenue. This forms the focus of our study: what is the role of regulatory institutions in host countries on offshoring innovation activities, and what is the impact of opting for an offshoring governance mode that is not aligned with theoretical prediction on business performance; we test, first, the impact of formal institutional variables, i.e., rule of law and intellectual property right (IPR) regimes, on governance choices, while controlling for factors derived from TCE and RBV; then we test whether institutional factors and any governance misalignment affect firm performance.

Using survey data from the Offshoring Research Network (ORN) database, we adopt a Heckman-based approach for the two-stage analysis. We find that the institutional factors in the host country do not have a significant effect on governance choices when offshoring innovation, but they have a negative effect on performance. Consistently with previous studies, we also find that governance misalignment has negative impact on firm performance. Previous studies have focused on analysing the relationship between governance choice and firm performance when offshoring business activities in general (e.g., manufacturing and business services). In this paper we contribute to the literature by focusing on offshoring of innovation activities, which play a critical role in management. We develop a better understanding of offshore governance choices for innovation in relation to institutional environments and their role on offshoring performance. In particular, we focus on analysing the impact of managers choosing a governance mode different from the one suggested by well-established theories (governance misalignment) on firm performance. The results offer managerial implications on what needs to be considered when choosing a specific governance mode, be aware of the possible impact of governance misalignment (fail to adopt a certain governance mode may result in negative impact on performance), and the role played by the institutional environment in offshoring destination countries.

The next section reviews literature on factors influencing governance choices when offshoring innovation, highlighting different theoretical perspectives – institutional theory, TCE and RBV, which leads to the development of research questions. Section 3 provides details on the sampling selection and the data. In Section 4, we discuss the variables and the empirical model, and present the regression results in Section 5. The paper concludes with a discussion of results (Section 6), and their implications to research and practice (Section 7).

2. Literature review and research questions development

Firms' international strategies and operations have been drawing attention from international business and management scholars for decades, and three main offshoring governance modes have been identified: the dominant equity or fully owned mode (also referred to as captive offshoring), the balanced mode (joint ventures), and external governance (offshore outsourcing) (Anderson and Gatignon, 1986). Captive offshoring refers to setting up a wholly owned subsidiary or new unit abroad and fully control its business activities to take advantage of local resources (Javalgi et al., 2009; Lewin and Volberda, 2011). Offshore outsourcing refers to client firms sourcing specific functions to a third-party (or vendor) in a foreign country, so that the client firm can create value primarily through low cost (Manning et al., 2008; Javalgi et al., 2009). Joint ventures refer to situations where an organisation partners with a local company in the host country (Luo et al., 2013). They are rarely used for offshoring and the equity

holders in these cases influence the foreign entity in a similar way to the dominant equity mode (Lewin and Couto, 2007). Therefore, this paper focuses on the two polar modes: captive offshoring and offshore outsourcing.

2.1. Factors influencing offshore governance choices

Transaction Cost Economics (TCE) and the Resource-Based-View (RBV) are the two theories that have been widely used by scholars to analyse governance choices. TCE addresses the boundaries of firms as a central strategic issue, and argues that the attributes of a transaction influence the governance decision, i.e., whether a transaction should be undertaken inside the firm or contracted to an external supplier (Jensen and Pedersen, 2012). The focus of TCE theory is on minimising the combined costs involved in transactions (Williamson, 1985). According to TCE perspective, transactions requiring low asset specificity and for which there is a high number of suppliers will occur in the market, while transactions with high asset specificity will occur within the firm. Regarding innovation offshoring, researchers have suggested that selecting captive is preferred when innovation tasks require firm-specific, idiosyncratic investments that external providers are not normally willing to make, especially for a relatively small client (Griffith et al., 2009; Kinkel and Maloca, 2009; Caniato et al., 2015).

RBV scholars argue that TCE overemphasises cost minimisation and neglects the value creation aspect of a transaction. RBV, instead, assumes that firms try to maximise long-term profits by exploiting and developing resources for competitive advantage (Javalgi et al., 2009). Due to their strategic role in determining competitive advantage, studies suggest that captive modes should be preferred for innovation offshoring (Lewin et al., 2009) because it facilitates accessing and recruiting skilled workers and other resources in host countries, while expanding and entering new markets (Kotlarsky and Oshri, 2008). Conversely, offshore outsourcing can offer access to new resources and market knowledge and allows integration into the firm's own knowledge base while maintaining organisational flexibility (Grimpe and Kaiser, 2010; Bertrand, 2011), and it also utilises suppliers to develop and deliver particular technologies for a client's new products (Mol et al., 2004; Nieto and Rodríguez, 2011). One critical factor in selecting the governance mode when offshoring innovation is about appropriating and retaining proprietary knowledge and IPRs. When outsourcing innovation, suppliers are normally involved only in specific parts or sub-tasks of a new product development process (Carson et al., 2006), not the full process, and this prevents external providers accessing strategic proprietary knowledge (Gooris and Peeters, 2016).

Scott (2013) and North (1990) maintained that a country's specific institutional environment is composed of a formal regulatory dimension, which includes governmental or political actions and legal regulations, and an informal dimension, that is, its social norms. These different dimensions create both opportunities and barriers to business activity. Williamson (1992) recognised that the institutional environment can affect the transaction costs, however, in TCE the institutional environment is only considered as a given 'background', whilst it should be brought to the forefront instead (Peng et al., 2009). Furthermore, resources are context-based, and their values depend on the characteristics of the given environment (Teece et al., 1997). Thus, institutional context should be integrated in the analysis of governance choices. Previous studies have shown that the global expansion of companies can be deeply affected by the host country's legal system and its enforcement (Flores and Aguilera, 2007; Gooris and Peeters, 2016). Offshore outsourcing can increase the risk of IP leakage when offshoring innovation (Ho, 2009; Mudambi and Tallman, 2010), as firms may have to share sensitive information with foreign suppliers. Thus, the consideration of governance choices and host country's legal system is particularly important, because IP leakage can erode a firm's competitive advantages (Hutzschenreuter et al., 2011).

Overall, TCE and RBV have been widely used to analyse governance choice due to their (main) underlying motives of cost efficiency and value creation (Meyer et al., 2009; Vivek et al., 2009), while studies acknowledge that institutional environments also affect the relevance of TCE and RBV for offshoring governance choices. However, to our knowledge, no study has empirically tested the influences of regulatory institutions (specifically, the quality of legal system and IPR protection in host countries) on governance choices and firm performance when offshoring innovation activities. Hence, our first two research questions are:

RQ1: Do regulatory institutions such as the rule of law and IPR regimes in host countries affect a firm's governance choices when offshoring innovation activities?

RQ2: Do regulatory institutions such as the rule of law and IPR regimes in host countries affect business performance when offshoring innovation activities?

2.2. Governance misalignment and firm performance

Research shows that firms perform significantly better if they choose the governance mode which is predicted by theories like TCE (Brouthers, 2002). In the specific case of innovation activities, issues around accessing resources in the host country and coping with local institutional settings may lead firms to make idiosyncratic governance choices that reflect the combination of firm-specific and host country conditions.

Previous studies have stated that firms should adopt a governance mode that is in line with its transaction characteristics, resources, and local context, thus a better firm performance can be achieved (Brouthers, 2002; Leiblein et al., 2002; Mudambi and Tallman, 2010). These three aspects are related to some dimensions of TCE, RBV and institutional theory, respectively. Therefore, we can expect that firms should perform better if their chosen governance mode is consistent with the one that is predicted by theories (i.e., TCE, RBV, and institutional theory). However, managers may over- or underestimate the effects of some influencing factors on performance and choose a governance mode that is not aligned with the one predicted by theories (Masten, 1993; Mol and Kotabe, 2011). Then, a crucial issue is to understand what happens if a firm selects a governance mode that is different from the one predicted by the selected theories. Some studies have highlighted the importance of governance misalignment for offshoring decisions in the general contexts of manufacturing and service industries (e.g., Brouthers, 2002; Leiblein et al., 2002; Elia et al., 2014). To our knowledge, there are no studies on the misalignment of governance choices when offshoring innovation activities. Thus, the third research question (RQ3) is:

RQ3: Does opting for a governance mode for offshoring that is not aligned with theoretical prediction affect business performance?

From the discussion above, we illustrate the conceptual framework in Figure 1.

3. Data and sample

The data used in this paper derive from the Offshoring Research Network (ORN) database. This dataset has been designed to investigate MNE's offshoring activities and/or governance choices (Manning et al., 2008; Lewin et al., 2009; Hutzschenreuter et al., 2011; Elia et al., 2014; Albertoni et al., 2017). Of these studies, only Elia et al. (2014) considers the misalignment between the actual governance choice and the one predicted by the model; none of them looks exclusively on innovation activities. ORN was launched in 2004 at Duke University Centre for International Business Education and Research (Lewin et al., 2009). It comprises a multi-country and longitudinal survey[2] of companies which are offshoring or considering offshoring business functions. The survey was sent to the most knowledgeable people – senior managers (such as global R&D managers) involved in global sourcing of business services in each firm to fill in the questionnaire (Manning et al., 2018). This database allows analysing the dynamics across various administrative and technical functions

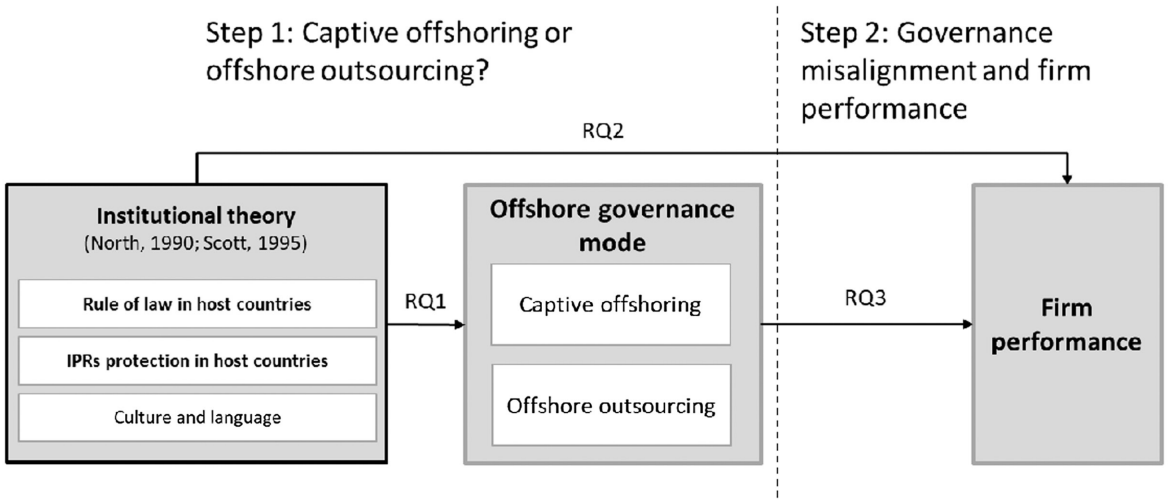

Figure 1. Conceptual framework of offshoring governance choices and firm performance.

located in a wide range of countries or regions of the world, across industries, and across types of delivery model (captive, third party or hybrid) (Lewin et al., 2009). The ORN database treats each offshored operation as a separate observation, so that the individual offshoring initiative is the unit of analysis and a single company may appear as multiple unique entries in the data set (Lewin et al., 2009). The full database includes 1,849 companies and 5,665 different offshore implementations during the period 1964-2009.

The business functions offshored are categorised into 13 different types[3] in the ORN database. In this paper we select product design, research and development, software development, and engineering services to represent innovation functions. The sample in this paper derives from three surveys conducted in 2007, 2009 and 2011. It includes 170 innovation initiatives carried out by 90 companies and spans over the period 1972–2009. The number of implementations of both captive and outsourcing modes in different locations and different industries, and firms' rating of driving factors by different offshoring location, function, and governance mode are summarised in Appendix A.

4. Empirical analysis

Previous studies have indicated that expectations of future performance drive firms to select an offshoring governance mode (Manning, 2014). This, in turn, results in a form of self-selection bias where the observed level of performance depends on unobserved factors that influence the firms' governance choices. In this analysis, endogeneity problems may affect results when using governance mode as the explicative variable of firm performance, as the former is also influenced by the expected level of the latter (Shaver, 1998; Brouthers, 2002). Following Shaver (1998), Leiblein et al. (2002), and Elia et al. (2014), we adopt a two-stage approach as described by Heckman (1979) to control for the potential endogeneity problem arising from the self-selection bias.

In the first stage (RQ 1), we estimate a probit model in which the governance mode (captive or outsourcing) is the dependent variable, and we regress this against a set of variables capturing the factors influencing offshore governance choices. The first stage helps calculate the inverse Mills ratio λ (Leiblein et al., 2002; Elia et al., 2014), which is used as a control variable in the second stage, thus providing consistent and unbiased coefficients (Greene, 2008). The first stage also estimates the misalignment between the governance mode predicted by the model and the one actually adopted by firms in our sample by comparing the estimated governance choice with the actual governance choice.

In the second stage (RQs 2&3), we use an ordered probit model to estimate the performance outcome of the focal offshoring implementation in a model which includes as independent variables the governance choice, the inverse Mills ratio, the governance misalignment, and the institutional factors (i.e., rule of law and quality of IPR protection in host countries). The following sections discusses the models and the variables employed in the two stages.

4.1. First stage: governance choice

4.1.1. Dependent variables

The ORN survey identified the governance modes of offshoring implementations as outsourcing mode and captive mode. We build a binary variable 'governance mode' that takes the value of '1' if the captive mode is chosen and '0' if the offshore outsourcing mode is chosen. This is our dependent variable 'Captive mode'.

4.1.2. Explanatory variables

This paper aims to test the relationships between the institutional factors (rule of law and IPR protection) in host countries and a firm's governance choices when offshoring innovation. The 'rule of law' reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (Kaufmann et al., 2003). We use 'rule of law' from The Worldwide Governance Indicators (WGI) as a proxy for measuring the quality of the host country's legal system. Considering that strategic offshoring discussions and decisions might be taken several months before an implementation, we calculated the average score three years prior to the launch year of the focal implementation.

We used the indicator developed by Ginarte and Park (1997)[4] to capture the IPR protection strength of host countries (Zhao, 2006). We used the 1990 value of this index if the implementation was launched before 1990. We used a linear approximation for the years between 1990 and 1995, 1995 and 2000, and between 2000 and 2005, using the data available for the years 1990, 1995, 2000 and 2005, and calculated the average score three years prior to the launch year of the focal implementation. 'Rule of law in host

country', and 'IPR in host country' are our explanatory variables.

4.1.3. Control variables

In the ORN survey, firms were asked 'What is the importance of each of the following drivers/risks in considering offshoring this function?' on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). We used factors shown by previous studies to influence the choice of offshore governance mode as the control variables in our analysis. Cost reduction is the typical reason driving firms offshore, and is especially important for offshore outsourcing (Farrell, 2005; Lewin and Couto, 2007). Therefore, 'Cost savings' is included as a control variable by calculating the mean value of 'labour cost savings' and 'other cost savings' in the ORN survey. Offshoring decisions can be driven by other strategic reasons, which include concern about IP risks, access to talent and new markets, increasing competitive pressure in the global market, and decreasing time-to-market for new products (Holcomb and Hitt, 2007; Kotlarsky and Oshri, 2008; Mudambi and Tallman, 2010; Massini and Lewin, 2012). 'IP loss risk', 'Access to talent', 'Access to new markets', 'Global strategy', and 'Speed to market' are therefore controlled. The size of the company can also affect governance mode choices (Hutzschenreuter et al., 2011), therefore the number of employees in the firm is log transformed (Number of employees) and included in the analysis.

In general, firms prefer to locate business activities, especially innovation activities, in countries that have a similar culture and economic development to their home country (Bunyaratavej et al., 2007; Parente et al., 2011). We therefore control for 'Cultural distance', which is calculated by applying the formula[5] adopted by Kogut and Singh (1988) based on Hofstede (2001) items. Finally, we control for the industry of the respondent firm by including four industry dummies[6] (Industry dummies) in the regression models. Table 1 reports variable descriptions.

Table 2 shows the descriptive statistics and the correlation matrix of the variables included in the first stage analysis. Almost all correlation coefficients are below 0.3 indicating that correlation is not a concern for most variables. The correlation coefficient between Cultural distance and Rule of law in the host country is 0.65. We calculated the variance inflation factor (VIF) to further investigate collinearity among variables. VIF scores of the independent variables ranges 1.07 to 2.34, which indicates the absence of collinearity (lower than 10) (Wooldridge, 2012).

4.2. Second stage: offshore outcomes

4.2.1. Dependent variables

In the second stage we focus on outcomes related to innovation offshoring. In the ORN survey, firms were asked 'To what extent do you agree that offshoring has measurably led to the following outcomes?' on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The outcomes include 'better focus on core competencies' (Core competencies), 'better access to qualified personnel' (Access to qualified personnel), 'improved organisational flexibility' (Organisational flexibility), and 'major product innovation(s)' (Major product innovation(s)).

4.2.2. Explanatory variables

One of the aims of this paper was to test the influence that institutional factors of the firm's host country have on achieving certain offshore outcomes. Therefore, variables that reflect the quality of the host country's legal system and IPR protection (i.e., Rule of law in host country and IPR in host country), are also included in second stage models.

Another aim of this paper is to test whether governance misalignment affects the achievement of certain outcomes. We created two dummy variables to represent governance misalignment, which are included in the explanatory variables. Following Leiblein et al. (2002) and Elia et al. (2014), we first calculated the predicted governance mode from the first-stage probit regression as a continuous variable (which ranges from 0 to 1). This is equal to Φ in the case of outsourcing, and equal to $1 - \Phi$ in the case of captive offshoring, where Φ is the standard normal cumulative distribution function defined as follows:

$$\text{Prob}\left(Y_i = 1\right) = \Phi\left(\beta' X_i\right)$$

Two dummy variables were then created: failure to select outsourcing (Fail to adopt captive), which is equal to '1' when the predicted mode was outsourcing and the actual mode was captive (i.e., $1 - \Phi > 0.5$), and '0' otherwise. The second dummy, failure to select captive (Fail to adopt outsourcing), is equal to '1' when the predicted mode was captive and the actual mode outsourcing (i.e., $\Phi > 0.5$) and '0' otherwise.

4.2.3. Control variables

The following factors used as control variables in the first stage are also controlled in the second stage: Number of employees, Cultural distance, and Industry dummies. Access to location-specific

Table 1. Description of the variables included in the first stage

	Variable name	Value	Data source
Dependent variable	Captive mode	1 = captive mode; 0 = offshore outsourcing mode	ORN survey
Explanatory variables	Rule of law in host country	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate of governance (ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance). Average score three years prior to the launch year of the implementation is calculated	The Worldwide Governance Indicators (WGI)
	IPR in host country	Reflects the strength of IPR protection in the firm's host country. The index is the unweighted sum of five separate scores for coverage, membership in international treaties, duration of protection, enforcement mechanisms, and restrictions (the score ranges from 0 to 4.88). We used the 1990 value for implementations launched before 1990. We used the linear approximation for the gap years between 1990, 1995, 2000 and 2005, and then we calculated the average score three years prior to the launch year of the focal implementation. We used the 2005 value for implementations launched after 2005	Ginarte-Park Index (1990, 1995, 2000, 2005)
Control variables	IP loss risk	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Lack of intellectual property protection' as a risk factor of offshore implementation	ORN survey
	Cost savings	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Cost savings' as a strategic factor of offshore implementation	ORN survey
	Access to new markets	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Access to new markets for products and services' as a strategic factor of offshore implementation	ORN survey
	Access to talent	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Access to qualified personnel offshore' as a strategic factor of offshore implementation	ORN survey
	Global strategy	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Part of a global strategy' as a strategic factor of offshore implementation	ORN survey
	Speed to market	1 (strongly disagree) – 5 (strongly agree) score attributed to 'Increasing speed to market' as a strategic factor of offshore implementation	ORN survey
	Cultural distance	Hofstede's cultural dimensions: Computed by applying the Kogut and Singh' (1988) index to the items provided by Hofstede (2001)	Hofstede's index
	Number of employees	Log transformed from variable 'emp_world', which indicates the number of employees in the company. Observations stating the number of employees is 0 were treated as missing values	ORN survey
	Industry dummies	Financial, insurance, banking services and professional services (Banking and Capital Markets, Finance & Insurance, Financial services, Professional Services); Manufacturing (Automotive, Consumer Goods, Manufacturing, Biotech & Pharmaceutical, Pharmaceuticals and Life Sciences); High tech and technical services (Aerospace and defence, High Tech, Software, Software and IT services, Technical Services, Telecommunications); Traditional service industries (Arts, Entertainment and Recreation, Construction, Government, Media, Utilities) (reference variable)	ORN survey

Table 2. Descriptive statistics and correlation coefficients (first stage)

Variable	1	2	3	4	5	6	7	8	9	10	11
1 Captive mode	1.000										
2 Rule of law in host country	0.054	1.000									
3 IPR in host country	0.034	0.230*	1.000								
4 IP loss risk	−0.077	0.187	−0.049	1.000							
5 Cost savings	−0.082	−0.114	−0.178	0.102	1.000						
6 Access to new markets	0.184	0.398*	0.082	0.081	0.011	1.000					
7 Access to talent	−0.131	−0.059	−0.014	0.027	0.057	−0.034	1.000				
8 Global strategy	0.257*	0.270*	−0.077	0.249*	0.058	0.594*	0.039	1.000			
9 Speed to market	−0.107	0.156	−0.061	0.198	0.027	0.348*	0.274*	0.270*	1.000		
10 Number of employees (Ln)	0.228*	0.079	−0.263*	0.179	0.091	0.055	−0.194	0.315*	0.067	1.000	
11 Cultural distance	−0.043	−0.648*	0.078	−0.099	−0.026	−0.279*	−0.043	−0.264*	−0.183	−0.265*	1.000
Obs.	145	145	145	145	145	145	145	145	145	145	145
Mean	0.372	0.076	3.469	3.166	3.928	2.669	4.069	3.379	3.931	7.365	2.657
Std. Dev.	0.485	0.682	0.667	1.286	0.884	1.467	1.065	1.365	1.110	3.155	1.441
Min	0	−0.96	1.632	1	1.5	1	1	1	1	0.693	0.024
Max	1	1.9	4.88	5	5	5	5	5	5	13.122	7.086

*$P < .01$.

resources and innovation capabilities are important drivers of offshoring innovation (Yang and Hayakawa, 2014; Martínez-Noya and García-Canal, 2015); a country's R&D intensity (the ratio of R&D expenditures/GDP) is used as an indicator of the country's innovation capability (e.g., Godin, 2005). We calculated the average R&D expenditures of the host country three years prior to the launch of the implementation to represent the national R&D intensity and innovation capability of host countries (% of R&D expenditures in host country) (e.g., Coccia, 2007). To control for self-selection bias, we included the inverse Mills ratio λ from the first stage regression as a control variable in the second stage regressions. We also included governance mode as a control variable, so that we could estimate the influence of governance choices on offshore outcomes. Detailed variable descriptions are shown in Table 3.

The descriptive statistics and the correlation matrix of the variables included in the second stage analysis are presented in Table 4. Almost all correlation coefficients are below 0.3 indicating that correlation is not a concern for most variables. A few correlation coefficients show values between 0.4 and 0.65. We calculated the variance inflation factor (VIF) to further investigate potential multicollinearity VIF scores of the independent variables range from 1.18 to 3.12 (host country's rule of law quality), which indicates absence of collinearity (lower than 10) (Wooldridge, 2012).

5. Results

5.1. *First stage results: factors behind offshore governance choices*

In this section, we report the results of the estimation of the effect of institutional factors (i.e., IPR protection strength and the quality of the rule of law in host countries) on innovation offshore governance choices.

In Table 5, model 1 shows the first-stage probit regression results. Neither the quality of the rule of law nor IPR protection strength in host countries show a significant effect on the probability of choosing the captive mode. Among the control variables, firms aiming at increasing the speed to market are more likely to select outsourcing. Firm size (i.e., the log number of employees) is positively correlated with the probability of choosing captive mode. The probability of choosing captive mode is also higher for firms in manufacturing and high tech and technical services industries.

5.2. *Second stage results: the relationships between governance misalignment, institutional factors, and the achievement of certain outcomes*

The second-stage ordered probit regression tests whether governance misalignment and institutional factors affect the achievement of certain outcomes when offshoring innovation. Specifically, we regress the following variables: 'better focus on core competencies', 'better access to qualified personnel', 'improve organisational flexibility', and 'major product innovation(s)' on governance misalignment, the quality of the rule of law and the IPR protection strength in host countries. We test models with and without the inverse Mills ratio (self-selection correction) to show whether unobserved firm characteristics affect governance choice and performance. In some models, the inverse Mills ratio is significant, therefore the discussion of the regression results of each outcome will focus on the models with an inverse Mills ratio reported in Table 6.[7]

Model 2 reports the results of the model with the outcome '*Major product innovation(s)*' as dependent variable. Results show that the IPR protection strength and rule of law in host countries is statistically significant and negatively related to the probability of achieving major product innovation(s), while the failure to select the predicted governance mode does not have a significant effect on achieving this outcome. Model 3 shows that 'failure to select outsourcing mode' has a significant negative impact on the probability of achieving the outcome of *focusing on core competencies*, while none of the institutional factors in host countries have significant impact. Model 4 shows that the rule of law in host countries is statistically significant and negatively related to the probability of achieving the outcome '*better access to qualified personnel*', while the failure to select the predicted governance mode does not have significant impact on the probability of achieving this outcome. Model 5 tests the relationship between the influencing factors and the achievement of '*improved organisational flexibility*'. The results show that 'failure to select outsourcing mode', the rule of law and the IPR protection strength in host countries are all statistically significant and negatively related to the probability of achieving this outcome.

Among the control variables, firm size and cultural distance between a firm's home and host country are both negatively related to the probability of achieving major product innovation(s). The host country's

Table 3. Description of the variables included in the second stage

	Variable name	Value	Data source
Dependent variable	Core competencies	'Better focus on core competencies', (1-5 score indicates not achieved to completely achieved)	ORN survey
	Access to qualified personnel	'Better access to qualified personnel', (1-5 score indicates not achieved to completely achieved)	ORN survey
	Organisational flexibility	'Improved organisational flexibility', (1-5 score indicates not achieved to completely achieved)	ORN survey
	Major product innovation(s)	'Major product innovation(s)', (1-5 score indicates not achieved to completely achieved)	ORN survey
Explanatory variables	Fail to adopt captive	1 = Failure to select captive; 0 = Otherwise	Created based on first-stage result
	fail to adopt outsourcing	1 = Failure to select outsourcing; 0 = Otherwise	Created based on first-stage result
	Rule of law in host country	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate of governance (ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance). Average score three years prior to the launch year of the implementation is calculated	The Worldwide Governance Indicators (WGI)
	IPR in host country	Reflects the strength of IPR protection in a firm's host country. The index is the unweighted sum of five separate scores for coverage, membership in international treaties, duration of protection, enforcement mechanisms, and restrictions (the score ranges from 0 to 4.88). We used the 1990 value for implementations launched before 1990, we use the linear approximation for the gap years between 1990, 1995, 2000 and 2005, and then we calculated the average score three years prior to the launch year of the focal implementation. We used the 2005 value for implementations launched after 2005	Ginarte-Park Index (1990, 1995, 2000, 2005)
Control variables	Captive mode	1 = captive mode; 0 = offshore outsourcing mode	ORN survey
	Cultural distance	Hofstede's cultural dimensions: Computed by applying the Kogut and Singh (1988) index to the items provided by Hofstede (2001)	Hofstede's index
	Number of employees	Log transformed from variable 'emp_world', which indicates the number of employees in the company. Observations stating the number of employees is 0 were treated as missing values	ORN survey
	% of R&D expenditures in host country	The average percentage of gross domestic expenditure on R&D (expressed as a percent of GDP) in host countries three years prior to the launch of the implementation	World Bank database
	Industry dummies	Financial, insurance, banking services and professional services (Banking and Capital Markets, Finance & Insurance, Financial services, Professional Services); Manufacturing (Automotive, Consumer Goods, Manufacturing, Biotech & Pharmaceutical, Pharmaceuticals and Life Sciences); High tech and technical services (Aerospace and defence, High Tech, Software, Software and IT services, Technical Services, Telecommunications); Traditional service industries (Arts, Entertainment and Recreation, Construction, Government, Media, Utilities) (reference variable)	ORN survey

Table 4. Descriptive statistics and correlation coefficients (second stage)

Variable	1a	1b	1c	1d	2	3	4	5	6	7	8	9
1a Core competencies	1.000											
1b Access to qualified personnel	0.446*	1.000										
1c Organisational flexibility	0.409*	0.387*	1.000									
1d Major product innovation(s)	0.264*	0.359*	0.202	1.000								
2 Fail to adopt captive	−0.054	0.056	0.058	−0.008	1.000							
3 Fail to adopt outsourcing	−0.115	−0.108	−0.285*	0.132	−0.153	1.000						
4 Rule of law in host country	0.153	−0.062	−0.015	0.066	0.079	0.082	1.000					
5 IPR in host country	0.112	0.046	−0.063	−0.010	−0.026	0.076	0.220*	1.000				
6 Captive mode	−0.120	−0.254*	−0.323*	0.129	−0.291*	0.526*	0.062	0.041	1.000			
7 Cultural distance	−0.086	0.045	0.047	−0.108	−0.100	−0.010	−0.644*	0.091	−0.049	1.000		
8 Number of employees (Ln)	−0.052	−0.114	−0.076	−0.095	0.144	−0.092	0.070	−0.274*	0.229*	−0.259*	1.000	
9 % of R&D expenditures in host country	0.187	0.095	0.154	0.169	−0.029	0.116	0.527*	0.542*	−0.024	−0.069	−0.308*	1.000
Obs.	143	143	143	143	143	143	143	143	143	143	143	143
Mean	3.469	3.804	3.804	2.524	0.126	0.140	0.085	3.477	0.371	2.639	7.398	0.939
Std. Dev.	0.948	0.951	0.929	1.150	0.333	0.348	0.682	0.668	0.485	1.443	3.161	0.482
Min	1	1	1	1	0	0	−0.96	1.632	0	0.024	0.693	0.121
Max	5	5	5	5	1	1	1.9	4.88	1	7.086	13.122	3.368

*$P < .01$.

Table 5. First-stage probit regression model – Dependent variable: Governance choices (1: Captive; 0: Outsourcing)

	Model 1
Rule of law in host country	−0.333 (0.281)
IPR in host country	0.212 (0.212)
Control	
IP loss risk	0.044 (0.117)
Cost savings	−0.210 (0.144)
Access to new markets	0.192 (0.124)
Access to talent	−0.122 (0.140)
Global strategy	0.213 (0.134)
Speed to market	−0.374** (0.139)
Number of employees (Ln)	0.170** (0.063)
Cultural distance	−0.090 (0.125)
Financial, insurance, banking and professional services	0.337 (0.785)
Manufacturing	1.498* (0.706)
High tech and technical services	2.076** (0.699)
_cons	−2.234 (1.403)
N	145
LR chi2 (32)	51.67
Prob > chi2	0.000
Pseudo R2	0.270
Log likelihood	−69.899

Standard errors in brackets. Significance levels: $*P < .05$, $**P < .01$, $***P < .001$.

R&D intensity is statistically significant and positively related to achieving all outcomes, suggesting that firms that offshore their innovation activities to a country that is investing in innovation capabilities, can gain access to valuable technological resources, and thus improve their performance (Yang and Hayakawa, 2014). The results also show that firms in Financial, insurance, banking and professional services, Manufacturing, and High tech and technical services industries are more likely to achieve these outcomes.

5.3. Robustness checks

We conducted robustness checks by using different time horizons to measure institutional variables and R&D intensity in the control variables. Our main model (Tables 5 and 6) was based on the average value of these variables three years before the launch of the offshoring initiative. We ran robustness tests using one year before the implementation launch, and obtained consistent results (Tables 7 and 8).

6. Discussion

This paper aims to find the influences that the quality of rule of law and IPR protection in host countries have on governance choices and firm performance when offshoring innovation activities, and the impact on firm performance if firms adopted a governance mode contrary to the mode that is predicted by theories.

Previous studies have stated that poor legal protection in host countries is one of the most severe risks that firms need to consider when making offshoring decisions (Nassimbeni et al., 2012). Research has also shown that firms prefer a captive mode when legal protection is weak, while offshore outsourcing is preferred when IPR protection is strong in host countries, especially when offshoring innovation activities (Oxley, 1999; Kshetri, 2007). On the other hand, outsourcing is selected when firms offshore in countries with weaker institutional regimes, to externalise risk (Manning et al., 2018).

Our regression results reveal that neither the rule of law nor the IPR protection strength in host countries have significant impact on governance choices. In addition, empirically, the risk of IP loss and the IPR protection strength in host countries show a low correlation coefficient. This, may indicate that when offshoring innovation, a firm's analysis of whether it will face the risk of lacking adequate IP protection is rather idiosyncratic to this individual firms which might adopt alternative strategies to protect their IP, such as only offshore smaller, separate innovation tasks as a strategy to preserve crucial proprietary knowledge of their innovation activities, as a way to cope with weaker IP protection level in host countries (as captured by the IPR index). Peng and colleagues (2009) proposed that in situations where formal constraints are unclear or fail, managers rely mainly on informal social ties like the local networks they established to reduce the uncertainty and gain benefits from such network-based strategies. Organisations possess managerial capabilities to monitor and control suppliers to ensure the safety of transactions with higher levels of asset specificity, for example, innovation activities (Cabral et al., 2014) and may use other strategies to control IP losses, such as disintegration of innovation activities and tasks, to prevent leaking of full information about their projects (Gooris and Peeters, 2016; Elia et al., 2019). This could also explain our regression results. We also found that increasing the speed to market is negatively related to the probability of choosing the captive mode, therefore we can conclude that outsourcing should support faster development of new products. The regression results suggest that the strategic factors driving firms offshoring innovation services to other countries influence their governance choices.

Table 6. Second-stage regression results: Effect of governance misfit on business outcomes

	Major product innovation(s) (Model 2)	Core competencies (Model 3)	Access to qualified personnel (Model 4)	Organisational flexibility (Model 5)
Fail to adopt captive	–0.440 (0.396)	0.204 (0.390)	0.514 (0.395)	–0.064 (0.400)
Fail to adopt outsourcing	0.383 (0.357)	–0.785* (0.355)	–0.192 (0.359)	–0.778* (0.358)
Rule of law in host country	–0.669** (0.237)	–0.081 (0.232)	–0.462* (0.235)	–0.442† (0.237)
IPR in host country	–0.343* (0.172)	0.056 (0.168)	0.065 (0.169)	–0.378* (0.174)
Control				
Captive mode	–0.133 (0.377)	0.499 (0.369)	–0.091 (0.373)	–0.439 (0.377)
Cultural distance	–0.257** (0.097)	–0.051 (0.093)	–0.060 (0.094)	–0.012 (0.094)
% of R&D expenditures in host country	0.913** (0.294)	0.578* (0.290)	0.570* (0.287)	1.033*** (0.295)
Number of employees (Ln)	–0.125* (0.053)	–0.040 (0.053)	0.025 (0.053)	–0.060 (0.053)
Mills	–0.392 (0.310)	0.642* (0.285)	0.468 (0.287)	0.147 (0.288)
Financial, insurance, banking and professional services	1.514** (0.464)	1.272** (0.420)	1.428** (0.428)	1.548*** (0.430)
Manufacturing	2.099*** (0.502)	1.372** (0.460)	0.995* (0.456)	1.688*** (0.472)
High tech and technical services	1.204* (0.475)	0.881* (0.442)	1.324** (0.447)	0.987* (0.449)
cut 1	–2.040 (1.182)	0.046 (1.143)	–0.189 (1.185)	–2.509 (1.226)
cut 2	–1.157 (1.179)	1.054 (1.156)	1.109 (1.156)	–1.398 (1.162)
cut 3	0.071 (1.181)	2.033 (1.162)	1.890 (1.161)	–0.310 (1.160)
cut 4	0.525 (1.180)	3.573 (1.171)	3.276 (1.178)	1.078 (1.168)
N	143	143	143	143
LR chi2 (32)	43.65	27.76	27.26	46.24
Prob > chi2	0.000	0.006	0.007	0.000
Pseudo R2	0.106	0.073	0.074	0.124
Log likelihood	–185.136	–175.274	–171.478	–162.727

Standard errors in brackets. Significance levels: $^{\dagger}P < .10$, $^{*}P < .05$, $^{**}P < .01$, $^{***}P < .001$.

After identifying the factors underlying governance choices, we further tested the influence of governance misalignment and institutional factors on achieving certain performance outcomes when offshoring innovation. Previous studies have stated that firms need to adopt a governance mode that is aligned with firms' resources, transaction characteristics, and local context (Brouthers, 2002; Leiblein et al., 2002). Scholars have observed that collaborations with suppliers via offshore outsourcing can offer firms access to new resources, which include the talent and technological resources of the suppliers in host countries (Javalgi et al., 2009; Contractor et al., 2010; Bertrand, 2011; Martínez-Noya and García-Canal, 2015). It can be noted that increasing number of firms have adopted offshore outsourcing in offshoring innovation, and the outsourcing industry has made huge progress and service providers have become more competitive and experienced (Lacity et al., 2009; Manning et al., 2018). Adopting offshore outsourcing of non-core activities to utilise suppliers' expertise and resources can free resources and give firms opportunities to focus on their core competencies and strengthen product or service innovation (Javalgi et al., 2009; Kedia and Mukherjee, 2009). Furthermore, since some innovation processes or functions can be offshore outsourced, without requiring internal resources and reducing fixed costs and assets, it is believed that a disintegrated, leaner and more modular organisational forms as offered by outsourcing could increase focal firms' flexibility (Contractor et al., 2010; Bertrand, 2011). If the innovation activities offshored to other countries do not concern a firm's core technologies, the failure to select the outsourcing mode could imply losing the benefits discussed above. Our results support these statements

Table 7. First-stage probit regression model (robustness test)

Governance choices (1: captive; 0: outsourcing)	
Rule of law in host country	−0.369 (0.282)
IPR in host country	0.314 (0.237)
Control	
IP loss risk	0.041 (0.116)
Cost savings	−0.216 (0.144)
Access to new markets	0.189 (0.124)
Access to talent	−0.124 (0.141)
Global strategy	0.218 (0.135)
Speed to market	−0.377** (0.139)
Number of employees (Ln)	0.169** (0.062)
Cultural distance	−0.095 (0.124)
Financial, insurance, banking and professional services	0.380 (0.790)
Manufacturing	1.539* (0.714)
High tech and technical services	2.096** (0.701)
_cons	−2.602† (1.455)
N	145
LR chi2 (32)	52.44
Prob > chi2	0.000
Pseudo R2	0.274
Log likelihood	−69.512

Standard errors in brackets. Significance levels: $^{\dagger}P < .10$, $^{*}P < .05$, $^{**}P < .01$.

by showing that firms that adopted the captive mode instead of outsourcing were less likely to achieve the outcomes of better focusing on core competencies, and improving organisational flexibility.

Our findings also suggest that if the rule of law and IPR protection are stronger in host countries, firms are less likely to improve their organisational flexibility and achieve major product innovations. The rule of law in host countries is negatively related to accessing qualified personnel. Offshoring provides MNEs access to knowledge in multiple markets and that they can benefit from increased diversity and heterogeneity in their knowledge bases (Nieto and Rodríguez, 2011). Apart from cost reductions, offshoring is also driven by strategic decisions/factors, such as gaining access to talent and technological resources, focus on core competencies, increase strategic flexibility (Massini et al., 2010). Offshoring R&D activities to countries with more specialised knowledge provides firms with location-specific resources and specialisation advantages, so that they can obtain better innovation inputs and enhance their innovation capabilities (Chung and Alcácer, 2002). Also, some firms disaggregate the value chain or innovation process and allocate each part into different countries. By doing so, firms can achieve higher organisational flexibility, and at the same time reduce the risks of operating in weak legal protection countries (Massini et al., 2010; Nieto and Rodríguez, 2011). The location choice for advanced offshoring activities has also evolved from developed countries to include developing countries (Massini and Lewin, 2012). Among the various offshoring locations, Asia is playing a vital role in the developing global innovation networks (Ernst, 2006; Dutta et al., 2019), as new countries have become prominent location choices and emerging economies are taking a leading position in attracting innovation activities. Firms have been seeking talent in emerging countries due to the scarcity of science and engineering graduates in developed countries (Lewin et al., 2009; Massini and Lewin, 2012; Borah et al., 2019). At the same, there have been concerns about the quality and enforcement of legal and IPR systems in emerging countries (Bardhan and Jaffee, 2005). However, the IPR protection in some host countries (e.g., China) has been improving in the last two decades to respond to the need to strengthen the domestic economy and indigenous technology capabilities, and attract FDI and innovation offshoring (Hong et al., 2022). Scholars argue that it is comparatively more important for firms to access resources available in emerging countries than concerns regarding the data security and IPR protection (Youngdahl et al., 2010). The growth of global sourcing of innovations suggests that companies are learning to cope with the risk by adopting varied strategies (Manning et al., 2008; Massini and Lewin, 2012). As Peng et al. (2009) suggested, in countries with unclear formal settings, firms can find alternative ways to reduce uncertainty, for example, building local networks. Product and process modularity can also be utilised by segmenting innovation products/process in ways that provide some IP protection in countries with weak IP regimes (Quan and Chesbrough, 2009; Gooris and Peeters, 2016). Therefore, firms can adopt specific strategies to efficiently and effectively utilise the location-specific resources in such countries, which could explain our regression results.

Previous studies argued that offshoring R&D activities to countries with more specialised knowledge provides firms with location-specific resources and specialisation advantages, and that they can therefore obtain better innovation inputs, achieve greater flexibility, and thus enhance their innovation capabilities (Nieto and Rodríguez, 2011). It is also stated that firms prefer to locate innovation activities in countries that have a similar culture to their home country (Bunyaratavej et al., 2007; Parente et al., 2011). Our regression results of the control variables are fully consistent with these studies.

Table 8. Second-stage regression results: Effects of governance misfit on different business outcomes (robustness test)

	Major product innovation(s)	Core competencies	Access to qualified personnel	Organisational flexibility
Fail to adopt captive	–0.236 (0.392)	0.104 (0.388)	0.610 (0.393)	–0.256 (0.400)
Fail to adopt outsourcing	–0.309 (0.359)	–0.729* (0.356)	–0.343 (0.359)	–0.707† (0.361)
Rule of law in host country	–0.783** (0.241)	–0.088 (0.234)	–0.450† (0.236)	–0.418† (0.239)
IPR in host country	–0.350† (0.194)	0.022 (0.191)	0.046 (0.192)	–0.570** (0.203)
Control				
Captive mode	0.016 (0.366)	0.376 (0.359)	–0.003 (0.363)	–0.643† (0.372)
Cultural distance	–0.297** (0.099)	–0.060 (0.094)	–0.064 (0.095)	–0.027 (0.096)
% of R&D expenditures in host country	1.081*** (0.288)	0.460† (0.278)	0.558* (0.277)	0.916** (0.284)
Number of employees (Ln)	–0.095† (0.054)	–0.073 (0.055)	0.021 (0.055)	–0.098† (0.055)
Mills	–0.231 (0.298)	0.563* (0.276)	0.516† (0.278)	0.032 (0.282)
Financial, insurance, banking and professional services	1.520** (0.465)	1.350** (0.422)	1.430** (0.429)	1.633*** (0.435)
Manufacturing	2.090*** (0.508)	1.461** (0.465)	0.974* (0.457)	1.740*** (0.479)
High tech and technical services	1.311** (0.479)	0.865† (0.443)	1.319** (0.447)	0.964* (0.452)
cut 1	–1.517 (1.239)	–0.680 (1.215)	–0.215 (1.254)	–3.965 (1.330)
cut 2	–0.605 (1.236)	0.429 (1.221)	1.093 (1.223)	–2.853 (1.263)
cut 3	0.637 (1.241)	1.434 (1.227)	1.888 (1.228)	–1.702 (1.253)
cut 4	1.112 (1.243)	2.966 (1.232)	3.255 (1.245)	–0.255 (1.255)
N	141	141	141	141
LR chi2 (32)	45.88	27.82	28.14	52.65
Prob > chi2	0.000	0.006	0.005	0.000
Pseudo R2	0.113	0.075	0.077	0.145
Log likelihood	–180.403	–170.730	–169.441	–155.597

Standard errors in brackets. Significance levels: †$P < .10$, *$P < .05$, **$P < .01$, ***$P < .001$.

7. Conclusions

This study focused on analysing the influence of institutional factors on offshore governance choices, especially the influence that institutional factors and governance misalignment have on the outcomes that can be achieved by offshoring. This paper builds on and extends the work of Brouthers (2002), Leiblein et al. (2002), and Elia et al. (2014) who analysed the importance of governance mode for offshoring manufacturing and business services and the effect of governance misalignment with theoretical predictions on performance. In this paper, we focus on innovation offshoring, explore the relationship between governance misalignment and firm performance by integrating institutional theory into analysis. Our study makes two contributions. First, we review prior literature on offshoring of innovation and observe that previous studies often treat institutional environment as a given 'background' (Peng et al., 2009), and its role in innovation offshoring has not tested adequately. We contribute to the literature on offshoring governance choices and firm performance by empirically testing the role of institutional factors on innovation offshoring, while also considering the impact from TCE and RBV perspective, that is, the theories normally considered in previous conceptual and empirical literature on governance choices. Second, the literature shows that firms perform significantly better if they choose the governance mode which is predicted by theories, for example, like TCE (Brouthers, 2002). In the specific case of innovation activities, two dynamics are a priori unclear, first, the possible consequences of managers choosing a governance mode that is inconsistent with the one predicted by relevant theories, and second, whether this effect will be the same for both governance modes, that is, choosing the 'wrong' governance mode will have a negative impact on performance. By using advanced econometric techniques, we contribute to the literature by studying these impacts and deepen our understanding of the relationships between governance choice and firm performance.

Our results can provide guidance to decision makers in corporations as they highlight the factors that need to be considered when choosing a specific governance mode, and the role played by the institutional environment in the countries being

considered for offshoring innovation activities. The first step regression results suggest that instead of choosing a governance mode according to host country's quality of legal protection, a firm should adopt a governance mode which is aligned with its strategic driving force: if firms want to increase the speed to market, they are more likely to adopt offshore outsourcing. The results also suggest that adopting an appropriate governance mode is very important for meeting strategic goals: if firms want to strengthen core competencies and improve organisational flexibility, managers should outsource when they offshore some innovation related activities. Since substantial investments may be required when adopting a captive mode, in addition to not being able to achieve these outcomes, adopting captive mode may bring even bigger losses if the theories suggest selecting outsourcing. Oxley (1999) stated that firms were reluctant to transfer advanced technologies to countries with weak legal rules and intellectual property regimes. However, these countries may possess resources that can still help firms achieve outcomes like improving their organisational flexibility, accessing qualified personnel, and major product innovations. Our results suggest that managers can still offshore innovation activities to countries that have weak legal protection systems on the condition of choosing strategies which can protect their own key technologies, for example through modularizing and disintegrating of innovation activities and strategically offshoring only some sub-activities which would not lead to leaking full knowledge about their innovation products and processes (Gooris and Peeters, 2016; Elia et al., 2019).

This paper presents some limitations. Although the ORN database contains comprehensive information about offshoring, the latest survey was conducted in 2011. Since then, the technology, industry and institutional dynamics are continuously changing due, for example, the adoption and diffusion of digital technologies in recent years, some of the specific tasks that have traditionally required human expertise can now be taken by machines or software (Ciarli et al., 2021). Consequently, firms' innovation offshoring decisions and governance choices, and their views regarding driving forces and concerns may also change to reflect new possibilities, and challenges, offered by digital technologies. In addition, other influencing factors could also be included to analyse governance choice and firm performance, such as past offshoring experience of managers and companies, whether the adoption of digital technologies can mitigate the negative impact of governance misalignment on performance in innovation process, etc. New updated surveys could be designed and conducted in the future to provide more fresh guidance on offshoring innovation in the digital age, this will then also shed new light on the power of existing governance theories and the need to adapt them. Furthermore, the empirical analysis in this study treats governance choices as dichotomous, but firms may select more varied governance solutions to handle different tasks in practice and engage in formal or informal collaborations and joint ventures, so the governance choices available to firms appear more as a spectrum between the two extremes considered in this study. The ORN database features only very few cases of such intermediate governance modes, which would have not allowed for robust analyses. In-depth interviews could also be conducted in future research to test the validity of our findings.

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Notes

[1] Governance mode in this paper refers to the choice between a fully owned foreign enterprise or outsourcing to a third-party provider of business services (see, among others, Hutzschenreuter et al., 2011; Nieto and Rodríguez, 2011; Roza et al., 2011).

[2] Conducted in 2005, 2006, 2007, 2009, and 2011.

[3] Analytical/knowledge services, call centre/customer contact, engineering services, finance/accounting, human resources, IT infrastructure, legal services, marketing and sales, product design, research and development, software development, supply chain and facilities, and "others".

[4] The Ginarte and Park index was produced for five-year intervals from 1960 to 1995, and Park later updated this index to 2005 (Ginarte and Park, 1997; Park, 2008). It measures the strength of patent protection in a country based on five different aspects: coverage, membership in international treaties, duration of protection, enforcement mechanisms, and restrictions.

[5] Kogut and Singh (1988) used the following formula for calculating Cultural distance:

$CD_j = \sum_{i=1}^{6} \{(I_{ij} - I_{iu})^2 | V_i\} /6$, where CD_j is cultural difference between the host country j and the home country u; I_{ij} refers to the index of the ith cultural dimension of Hofstede's six cultural dimensions in the jth host country; I_{iu} refers to the index of the ith cultural dimension of Hofstede's cultural dimensions in the uth home country; V_i is the variance of the index of the ith dimension.

[6] The four industry dummies are: Financial, insurance, banking services and professional services; Manufacturing; High tech and technical services; Traditional service industries (reference variable).

[7] The regression results without the inverse Mills ratio are presented in Appendix B.

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innovation. He has also worked on theoretical issues of the governance of socio-technical systems and the governance of responsible research and innovation. More recently, he began working on the role of intangibles for innovation and competitiveness and policy interventions to support their development and use. Another, long-standing area of interest is understanding the dynamics and drivers of the internationalization of research and innovation activities and related governance and policy issues.

APPENDIX A

Descriptive analysis

Tables A1 and A2 show the number of implementations of both captive and outsourcing modes in different locations (Table A1) and different industries (Table A2).

Table A1. Governance mode by location – Innovation services and Other business services

		Innovation services			Other business services		
Country		Outsourcing	Captive	Total	Outsourcing	Captive	Total
China	No.	13	12	25	4	19	23
	%	52%	48%		17%	83%	
India	No.	55	23	78	91	50	141
	%	71%	29%		65%	35%	
Developed countries	No.	11	8	19	16	30	46
	%	58%	42%		35%	65%	
South and South East Asia, Africa, and Latin America	No.	10	14	24	67	24	91
	%	42%	58%		74%	26%	
Eastern and Central Europe	No.	14	10	24	12	15	27
	%	58%	42%		44%	56%	
Total	No.	103	67	170	190	138	328
	%	61%	39%		58%	42%	

Table A2. Governance mode by industry – Innovation services and other business services

		Innovation services			Other business services		
Industry		Outsourcing	Captive	Total	Outsourcing	Captive	Total
Traditional industries and traditional service industries	No.	11	2	13	18	23	41
	%	85%	15%		44%	56%	
Financial/insurance/banking and professional services	No.	23	3	26	102	37	139
	%	88%	12%		73%	27%	
Manufacturing	No.	19	26	45	47	43	90
	%	42%	58%		52%	48%	
High tech and technical services	No.	50	36	86	28	44	72
	%	58%	42%		39%	61%	
Total	No.	103	67	170	195	147	342
	%	61%	39%		57%	43%	

In the ORN survey, firms were asked to rate the importance of the factors affecting their offshoring choice for each of their implementations using a 1-5 scale, from strongly disagree (1) to strongly agree (5). Therefore, a score of 4 and 5 indicate agreement with a factor. The proportion of these implementations is calculated by dividing the number that rate this factor as important by the total number that answered this question. We compare firms' rating of these factors by offshoring location, different function, and different governance mode (Figures A1 and A2). The graphs show that the governance mode adopted by firms differs depending on the region and business activity, and that different factors affect their choice over the period of analysis. The outcomes, modes, and destinations vary more widely for innovation activities, and this supports focusing specifically on offshoring innovation activities in our study.

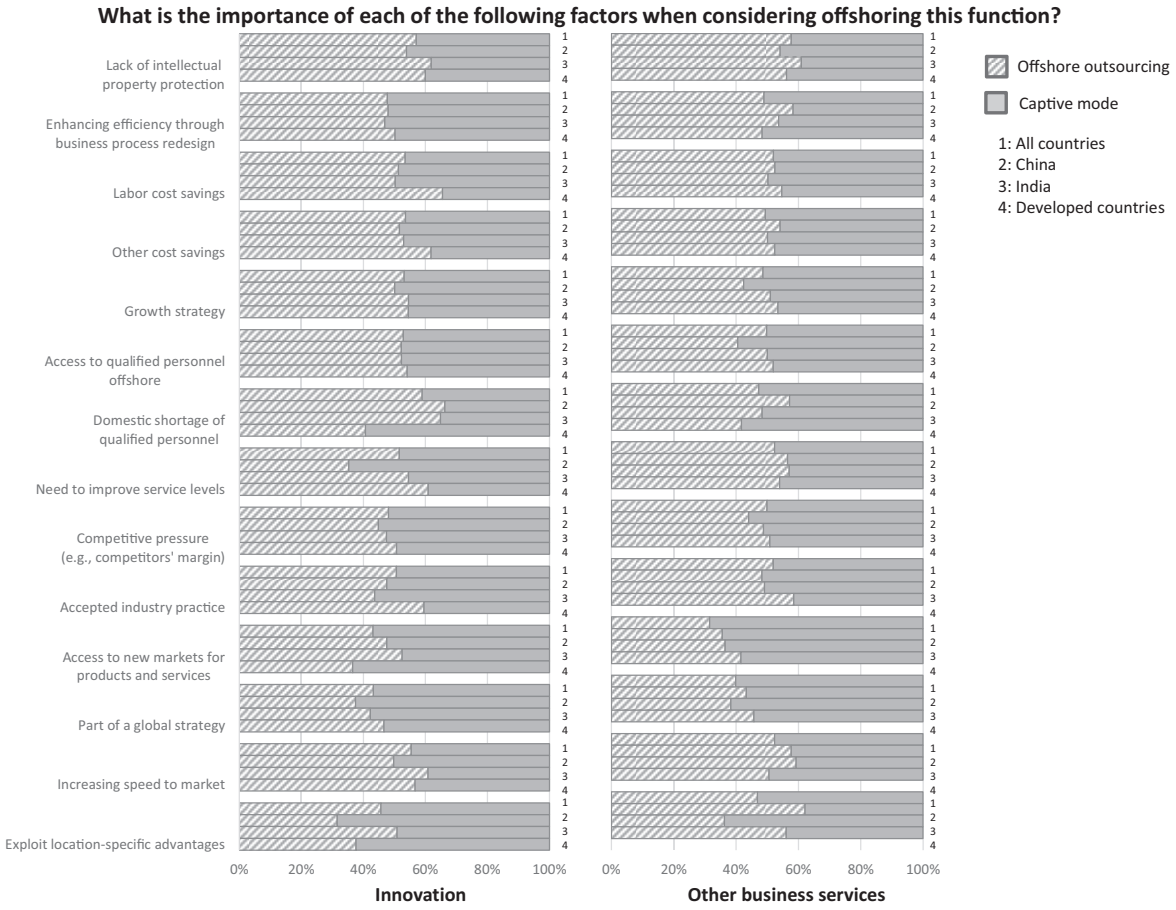

Figure A1. Firms' perception of factors influencing the offshoring decision about innovation and other business services, by different governance mode in varied locations. [Colour figure can be viewed at wileyonlinelibrary.com]

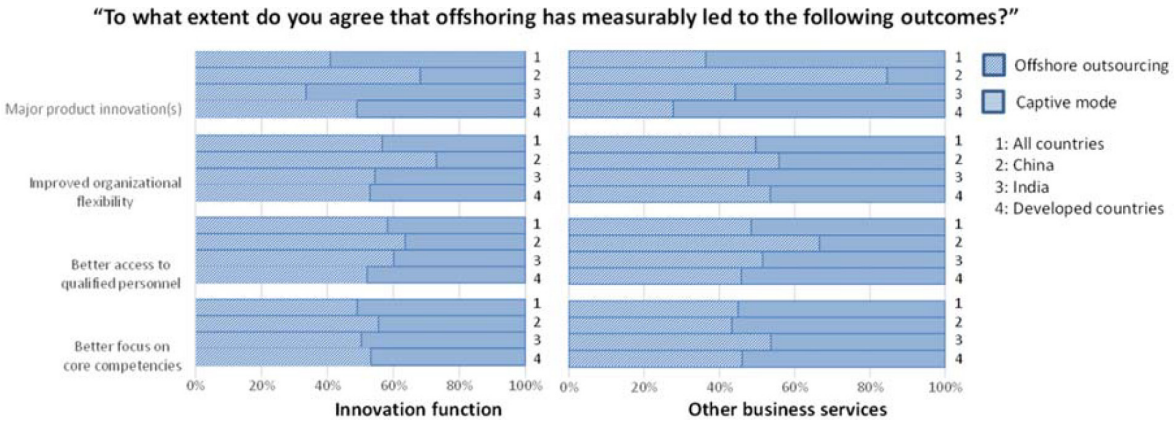

Figure A2. Firms' perception of the achievements from deciding to offshore innovation and other business services, by different governance mode in varied locations. [Colour figure can be viewed at wileyonlinelibrary.com]

APPENDIX B

Second-stage regression results (without inverse Mills ratio)

	Major product innovation(s)	Core competencies	Access to qualified personnel	Organisational flexibility
Fail to adopt captive	−0.178 (0.338)	−0.222 (0.340)	0.199 (0.344)	−0.164 (0.348)
Fail to adopt outsourcing	0.229 (0.336)	−0.524 (0.335)	0.000 (0.338)	−0.717* (0.338)
Rule of law in host country	−0.657** (0.237)	−0.089 (0.232)	−0.466* (0.234)	−0.444† (0.237)
IPR in host country	−0.304† (0.169)	0.002 (0.166)	0.025 (0.167)	−0.389* (0.172)
Control				
Captive mode	0.147 (0.306)	0.047 (0.310)	−0.419 (0.314)	−0.544† (0.316)
Cultural distance	−0.261** (0.097)	−0.053 (0.092)	−0.063 (0.094)	−0.014 (0.094)
Number of employees (Ln)	−0.094* (0.047)	−0.093† (0.047)	−0.013 (0.048)	−0.071 (0.048)
% of R&D expenditures in host country	0.925** (0.294)	0.508† (0.287)	0.522† (0.285)	1.018** (0.293)
Financial, insurance, banking and professional services	1.506** (0.462)	1.250** (0.419)	1.412** (0.428)	1.539*** (0.429)
Manufacturing	2.306*** (0.478)	0.987* (0.425)	0.722† (0.423)	1.598*** (0.438)
High tech and technical services	1.525*** (0.408)	0.326 (0.365)	0.920* (0.370)	0.858* (0.370)
cut 1	−0.881 (0.749)	−1.866 (0.764)	−1.585 (0.816)	−2.959 (0.853)
cut 2	0.001 (0.747)	−0.909 (0.757)	−0.308 (0.761)	−1.841 (0.772)
cut 3	1.222 (0.756)	0.048 (0.756)	0.456 (0.756)	−0.755 (0.763)
cut 4	1.669 (0.761)	1.574 (0.759)	1.827 (0.770)	0.630 (0.768)
N	143	143	143	143
LR chi2 (32)	42.03	22.66	24.59	45.98
Prob > chi2	0.000	0.020	0.011	0.000
Pseudo R2	0.102	0.060	0.066	0.124
Log likelihood	−185.945	−177.822	−172.813	−162.857

Standard errors in brackets. Significance levels: $^{\dagger}P < .10$, $^{*}P < .05$, $^{**}P < .01$, $^{***}P < .001$.