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Captive Offshoring, Innovation and Market Diffusion: Evidence from the Swedish Community Innovation Survey

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Abstract

Although the effects of captive offshoring on firm innovation have increasingly become a subject of study, the literature did so far not distinguish between the effects on introducing innovation as opposed to the effects their market diffusion. This distinction is important. By integrating insights from the innovation diffusion literature, we argue that the effects of captive offshoring on home base innovation are likely to differ between the generation and the diffusion phases. Using a matched employer-employee panel dataset drawn from consecutive waves of the Swedish Community Innovation Survey (CIS) between 2009 and 2015, it is shown that captive offshoring, as measured by the share of employees at foreign locations, has an inverted u-shape effect on innovation propensity (with positive effects for the average firm). In contrast, employment offshoring does not, on average, affect the rate of diffusion as measured by the share of turnover from new products. For firms with more novel product innovations, the effects are even negative.

Keywords International employment · Innovation · Diffusion · Community innovation survey · Sweden

JEL Classification M14 · M16 · O32

Introduction

The effects of captive offshoring on innovation activities have become an increasingly important topic in the IB literature, showing evidence of both benefits in terms of access to globally dispersed knowledge (Nieto & Rodriguez, 2011; Rodriguez &

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Nieto, 2016; Steinberg et al., 2017) and costs resulting from increasing managerial complexity (Fifarek et al., 2008; Baier et al., 2015), higher demands on knowledge integration (Singh, 2008; Yang et al., 2008) and dependence on external knowledge sources (Valle et al., 2015). Some authors have proposed that the simultaneous existence of costs and benefits generates an inverted u-shape relationship (Mihalache et al., 2012; Baier et al., 2015), implying that the central task of international management is to find optimal trade-offs. Despite a rapidly accumulating literature, there is still substantial ambiguity in the findings on the offshoring-innovation relationship, with little agreement whether or under which conditions the effects are positive, negative or non-linear. Integrating an extant literature on mechanisms driving diffusion of innovation (Rogers, 1976; Rosenberg & Mowery, 1979; Rosenberg, 1982; Hall, 2004; Peres et al., 2010, van Oorschot et al., 2018), we argue that offshoring will affect the propensity to introduce innovations differently than their market diffusion. Because the distinction between innovation propensity and market diffusion has been largely ignored in the IB literature, this gap may contribute to explaining the empirical and conceptual ambiguities in the offshoring-innovation relationship.

This paper contributes to filling this gap by unravelling the effects of captive employment offshoring on the likelihood of introducing product innovation and their market diffusion. To develop the argument, it is highlighted that most of the proposed mechanisms by which offshoring affects innovativeness, in particular in setting where resource exploring motives dominate (Meyer, 2015, Papanastassiou et al., 2020), relate to a firm's internal capabilities to innovate. This is most evident in the case for the access-to-knowledge argument stating that offshoring allows firms to access valuable knowledge abroad (Almeida & Phene, 2008; Bos et al., 2017; Zhang et al., 2019). However, it is also true for implied costs resulting from managerial complexity (Kedia & Mukherjee, 2009; Baier et al., 2015) or intra-firm opportunism (Ceci & Prencipe, 2013), as both mechanisms directly address a firm's ability to structure effective managerial processes to allow for innovation. Instead, the effects of the capability-related factors on diffusion and adoption are largely indirect because firms cannot directly affect a customer's decision to adopt an innovation, which is largely based on customer-to-customer communication processes (Mahajan et al., 2000; Goldenberg et al., 2010; Peres et al., 2010). Moreover, the literature has highlighted that objective product superiority, which is likely to be positively affected by higher innovation capabilities, which is often not strong predictor of diffusion (Rogers, 2002; Mndzebele, 2013). Thus, the first major proposition is that employment offshoring primarily influences the innovation propensity, while the effects on diffusion are indirect and thus expected to be less salient.

Secondly, we argue that in the case of novel product innovations, employment offshoring may actually result in negative consequences. An important reason is that offshoring often implies a fragmentation of a firm's value chain, which may divert managerial attention away from local markets. Since market diffusion of more novel and thus more complex technologies (Rogers, 1976; Pelz, 1985; Hall, 2004) becomes critically reliant on close user-producer interactions and communication (Newell et al., 2000; Liyanage et al., 2012), international firms may increasingly find it hard to maintain such close interaction patterns (Maehler et al., 2011; Zhang et al., 2015). Consequently, when firms rely strongly on novel technologies,

offshoring may create barriers to customer learning with regard to the application of new technologies (Rosenberg, 1982; McWilliams & Zilbermanfr, 1996), which may slow down diffusion.

To test for the hypothesised differences in the effects of employment on innovation propensity as opposed to market diffusion, the Swedish Community Innovation Surveys (CISs) from 2009, 2011, 2013 and 2015 were matched to data on the employment structures abroad drawn from Svenska-Koncerner-i-Utlandet (SVIK)-database. The main findings are as follows. First, higher shares of employees abroad are associated with a higher likelihood of introducing product innovation to moderate levels of employment offshoring and a lower likelihood above the threshold, corroborating the inverted u-shape found by Mihalache et al. (2012) and Baier et al. (2015). Second, the baseline results for the market diffusion variable and share turnover due to new products are insignificant. Third, for firms with more novel product innovations, offshoring affects market diffusion negatively.

Our paper holds important theoretical, empirical and practical implications. On a conceptual level, we unravel the concept of innovativeness into innovation propensity and the ensuing market diffusion, as measured by turnover due to new products. This distinction is an established topic in innovation studies, economics, sociology, marketing and political sciences (Kamien & Schwartz, 1972; Mowery & Rosenberg, 1979; Hall, 2004; Peres et al., 2010; van Oorschot et al., 2018). However, it has not been explicitly considered within the IB literature. On an empirical level, the importance of the proposed differentiation into innovation propensity and market diffusion is highlighted, because employment offshoring primarily affects the innovation propensity. Moreover, there is evidence that, for firms with more novel product innovations, market diffusion can even be negatively affected by employment offshoring. On a practical level, the results are highly relevant. The IB literature originally emphasised the benefits of offshoring on innovation. However, recently it has paid increasing attention to its costs, too. Arguing for an inverted u-shape relationship, it has warned managers against excessive levels of offshoring (Mihalache et al., 2012; Baier et al., 2015). While this trade-off view is corroborated, where the central managerial task is to optimally balance benefits and costs for innovation propensity, our results suggest the existence of negative effects for diffusion. For managers, this adds an extra layer of complexity, because international activities optimally balanced for innovation propensity may already harm market diffusion. Solving this partly conflict-ridden relationship is far from simple and goes a considerable way beyond avoiding “over-offshoring”.

Theory

The past thirty years have shown a marked increase in firms’ integration into global value chains (Kano et al., 2020). Schwörer (2013), Table 1 finds that for Europe, the amount of sourcing from other countries has increased from 1995 to 2008 by about 40%. Beyond pure sourcing, the ownership-based modes of internationalisation, such as captive innovation offshoring, i.e. owning subsidiaries abroad, have also increased. Castellani et al. (2017) provide evidence that in the 2800 most

Table 1 Descriptive statistics

Variable	<i>N</i>	Mean	SD	Min	Max
Innovation propensity (product innovator dummy)	9102	0.40	0.49	0.00	1.00
Market diffusion (share of turnover with new products %)	9102	3.58	13.11	0.00	100.00
Share employees in foreign locations (%)	9102	30.01	15.81	0.00	100.00
Employees	9102	147.60	786.13	1.00	28,600.00
R&D intensity	9102	78.71	7486.94	0.00	714,000.00
Labour productivity	9102	815,000.00	2,000,000.00	77.09	91,700,000.00
Capital intensity	9102	0.50	30.01	0.00	2847.60
Importance market novelties	9102	0.35	0.37	0.00	1.00

R&D-intensive firms, 33% of all subsidiaries were located outside the firm's home country. Thus, firms have become widely geographically fragmented, which in turn begs questions about the effects on firms' abilities to strategically organise their international network.

Research on the performance effects of the modes of captive offshoring have burgeoned in the past, yielding evidence for both benefits, for example, in terms of lower production costs (Levitt, 1983; D'Attoma & Pacei, 2014), economies of scale and scope provided by large international suppliers (Grossman & Helpman, 2005), or better access to and knowledge of foreign markets (Castellani & Zanfei, 2006; Castellani et al. 2017), as well as, for example, costs in terms of greater fragmentation (Kedia & Mukherjee, 2009), managerial complexity (Baier et al. 2015) and loss of control (Ceci & Prencipe, 2013). However, the overall effects remain somewhat ambiguous. For low knowledge-intensive functions that are offshored, the effects of lower production costs often outweigh the associated costs resulting from principal-agent problems (Ceci & Prencipe, 2013). For highly knowledge-intensive functions, innovation in particular, the story may be different because of substantially inflated costs (Fifarek et al. 2008) resulting from an overall increased managerial complexity associated with globally dispersed businesses (Baier et al., 2015; Castellani et al., 2017).

Despite a rapidly growing literature, the effects of internationalisation on innovativeness are still somewhat unclear. One important issue is that the literature has ignored the distinction between the generation of innovation and its diffusion. An empirical consequence is that innovativeness measures have been used almost interchangeably, often with little consideration as to their theoretical meaning, including turnover with new products (Mihalache et al., 2012), organisational innovations (Baier et al., 2015) or patents (Belderbos et al., 2020; Zhang et al., 2019).

In the following, an effort is made to integrate into the literature on the offshoring-innovation-relationship the distinction between innovation propensity and market diffusion, as two interlinked yet very clearly distinct parts of the innovation process. As concerns the offshoring measure, we focus on the effects of employment offshoring. This broader measure of international activities comes at the price of providing limited insight on the specific internationalisation strategies—most notably it may

conflate resource exploring and exploiting strategies (compare Papanastassiou et al., 2020). However, the used dataset is heavily dominated by small and medium-sized firms, which are known to focus more on resource exploration (Roza et al., 2011) implying that this drawback may be limited. Moreover, little is known on the effects of employment offshoring on innovation, and since most of the employees abroad are not directly concerned with innovation (Massini & Miozzo, 2012), focusing on this measure in itself provides an additional layer of novelty.

International Operations and Home-Base Innovativeness

The long discussion has emphasised the increasing role of asset-seeking strategies when internationalising (Kuemmerle, 1996; Meyer, 2015; Papanastassiou et al., 2020). Building on this literature, a number of studies have analysed how internationalisation affects a firm's innovation performance at the home base (see Lahiri, 2010; Kotabe et al. 2007; Nieto & Rodríguez, 2011; Steinberg et al., 2017; Rosenbusch et al., 2019). Several studies emphasised the advantages associated with internationalisation of innovation, for example, lower costs, greater flexibility in accessing talent, and a more diverse set of knowledge sources, as well as improved knowledge of foreign markets, allowing for tailor-made goods and services (Rosenbusch et al., 2019; Doh et al., 2009; Lewin et al., 2009; Cuervo-Cazzuro et al., 2015). Several studies support the view of emphasising the benefits. It has been shown that internationalisation may affect the distribution of tasks in the way that more knowledge-intensive activities become concentrated at the home base (Dachs et al., 2015; Grossman & Rossi-Hansberg, 2008). Crinò (2012), for example, shows that importing inputs leads to a specialisation in high-tech production and, to some degree, R&D. Similarly, Castellani & Fassio (2019) provide evidence that importing increases exports of newly developed products. Furthermore, home-base innovation activities may benefit because of reverse technology transfer from abroad (Castellani & Pieri, 2013; Schubert et al., 2018; D'Agostino et al., 2013), which represents the classic reason for tapping into globally dispersed and unique knowledge sources (Haakonsson, 2013; Meyer, 2015; Rosenbusch et al., 2019; Luo, 2021). Rosenbusch et al. (2019) argue that home-base innovation activities may be beneficial, especially when differences in cross-border differences in institutional contexts allow for what they term “institutional arbitrage”. For example, if property rights are relatively strong at the home base, there may be a tendency to position innovation activities at the home base (Brander et al. 2017; Estrin, 2016). Moreover, internationalisation often generates the need to adapt goods or services to local needs and tastes (Dunning, 1993; Cuervo-Cazzura & Narula, 2015; Schubert et al., 2018) and thus may stimulate innovation activities. A final point is related to efficiency and posits that captive offshoring of non-innovation-related tasks may also free up resources that can be used for home-based innovation (Fifarek et al., 2008).

Yet, there are also a number of studies that take a more sceptical perspective, proposing that costs may also be widespread (compare Valle et al., 2015). It has been argued that offshoring leads to more dispersed organisations and may therefore suggest substantial costs associated with captive offshoring (Singh, 2008).

Two mechanisms have been proposed. One is associated with the disadvantages of decomposition that occur as interdependent tasks become geographically separated and therefore more difficult to coordinate, for example, because of cultural differences or because of technical difficulties in efficiently managing information flow over longer distances (Li et al., 2006; Kedhia & Mukherjee, 2009; Baier et al., 2015). A second mechanism results from threats associated with opportunistic behaviours, which are aggravated by geographic dispersion. In particular, Ceci and Prencipe (2013) argue that the inability to implement effective monitoring and supervision over geographically separated business locations will potentially cause extensive principal-agent problems.

Because of the coexistence of costs and benefits of captive offshoring on innovation performance, the effects are not *a priori* clear. However, the coexistence of costs and benefits may imply a trade-off, leading clearly to an inverted u-shape between offshoring and innovativeness. This holds true if the costs disproportionately increase the degree of internationalisation, while the benefits taper off (see Baier et al., 2015). On the cost side, complexity and opportunism issues are likely to still be manageable for comparably low levels of internationalisation. This is mainly due to the fact that problems due to complexity and opportunism result from incomplete and asymmetric information, which may be less problematic in geographically more concentrated businesses. Instead, important parts of the theoretical benefits are expected to have the opposite effect. Benefits resulting from tapping into new knowledge bases are probably substantial for low levels of internationalisation, but may have much smaller margins for very big international firms. Indeed, in related though not identical settings, some authors have provided evidence of the existence of an inverted u-shape. Baier et al. (2015), for example, show that internationalisation of innovation and organisational adaptability follow a curvilinear relation. Mazzola et al. (2019) make a similar case for production offshoring and innovation performance. Mihalache et al. (2012) provide evidence for firm functions that provide inputs to innovation.

Differentiating Between Innovation Generation and Market Diffusion of Innovation

So far, a recap of the literature was provided suggesting that there is probably an inverted u-shape relationship between offshoring and a firm's innovativeness. As indicated previously, the arguments for a curvilinear relationship are pervasive. However, since none of the works clearly distinguish between innovation propensity and market diffusion, it remains unclear whether the inverted u-shape holds for the creation of innovations, their diffusion, or both.

To allow for a clearer analysis of these problems, we review and integrate key insights from the diffusion of innovation literature, mostly from economics and marketing sciences, which argued that diffusion is the process where customers make adoption decisions (Rogers 1976). These individual adoption decisions are, however, not independent from one another but are embedded in social relationships, which are driven by communication and interaction between customers and customers, as

well as between customers and all other relevant actors (Peres et al., 2010; Mahajan et al. 2000; Goldenberg et al. 2010). By relying on adoption, diffusion is, unlike innovation propensity, more a demand- than a supply-side phenomenon (Liyanage et al. 2012).

In an attempt to identify the mechanisms by which firms can affect innovation diffusion, the literature has identified in particular the ease of use, trialability and compatibility with norms, values or prior solutions as important dimensions (Rogers, 1976; Tornatzky & Klein, 1982; Mndzebele, 2013). However, the literature notes at best, an indirect influence on diffusion is possible, because the adoption decision remains out of the direct control of the firm, which differentiates innovation diffusion from its original generation. The creation of an innovation is typically based on a firm's internal processes, such as R&D, product development and production. These processes are much more capability-driven, driving both the willingness to engage in and the success of the innovation activities (compare also Regnér & Zander, 2014). While customers may also influence a firm's internal innovation processes, for example, within the context of user-driven innovation models (von Hippel, 2006; Franke, 2014), their role is typically secondary to the firm's internal capabilities to innovate in the first place. The effects of offshoring on the creation of innovation, as opposed to diffusion, thus need to be understood: how internationalisation affects the emergence of innovation-related capabilities as opposed to how it affects demand-side socially embedded adoption processes.

Understanding innovation creation as primarily a knowledge- and capability-driven process, and diffusion of innovation as a demand-side-driven process, has deeper implications for how internationalisation is likely to affect both. In particular, most arguments in the IB literature suggest that either costs or benefits of internationalisation inherently appeal to the concept of capabilities in particular in circumstances where firms are following asset seeking or competence exploring strategies. For example, the view that internationalisation guarantees access to globally dispersed knowledge (Zhang et al., 2019) or talent (Peters et al., 2010) refers directly to a firm's proven innovation capabilities. These innovation capabilities can be reasonably assumed to directly increase the likelihood of introducing product innovations. While it appears intuitive to assume that higher innovation capabilities have a positive influence on the relative advantage of the product, facilitating the market diffusion of a product (Tornatzky & Klein, 1982), the diffusion literature has shown that relative advantage is itself a multidimensional construct, which beyond technical superiority of the product, appears to depend more on its ease of use, trialability and compatibility with existing values, norms and beliefs (Templeton & Byrd, 2003). It is proposed that these latter three dimensions may be more difficult to achieve in an international context. Moreover, while internationalisation may through its effect on innovation capability have increased product superiority, technical superiority often only of secondary importance as a determining factor in diffusion (Rogers, 2010); e.g. Mndzebele (2013) provides evidence that technical superiority did not positively affect adoption in information technology (IT) innovations in hotel management.

In an international context, we thus claim that offshoring mostly affects a firm's innovation capabilities, for example, by improving a firm's access to international talent or knowledge. However, the associated increases in innovation-relevant

capabilities are likely to have a more direct effect on innovation propensity than it has on a customer's decision to adopt the resulting innovation. A similar argument can be made for the cost side: the literature has highlighted intra-firm opportunism and managerial complexity as major threats (Baier et al., 2015; Ceci & Prencipe, 2013). These costs will directly affect a firm's internal capabilities of introducing innovation, for example, when managerial complexity defies effective knowledge integration. The effect of these costs on market diffusion, however, is again indirect and channelled through the technological specifications of the product, which is just one of many factors influencing the adoption. To summarise the discussion of this and the previous subsection, which suggests an inverted u-shape and the importance of differentiating between innovation generation and diffusion of innovation, we conclude with the first two hypotheses:

H1: The effect of employment offshoring on innovation as measured by innovation propensity follows an inverted u-shape.

H2: The relationship between employment offshoring and innovation is more stable for innovation propensity than for market diffusion.

Novelty of Product Innovation as a Moderator on Contextual Factors

H1 and H2 are the baseline expectations and suggest that, although there are both costs and benefits associated with employment offshoring with respect to a firm's level of innovation, the effects are weaker for the diffusion of innovation. The line of reasoning is that offshoring primarily affects a firm's innovation capability, which, by changing the characteristics of the product innovation, only indirectly affects diffusion of innovation.

Going beyond the baseline expectation in H2, the diffusion literature has identified a number of key characteristics, which directly affect the diffusion process, implying that the conclusion in H2 may be moderated by contextual factors. In particular, a number of authors have proposed that the complexity of an innovation is a decisive influencing factor for its diffusion (Rogers, 1976; Hall, 2004; Wonglimpiyarat, 2005). We make an argument that more novel products typically generate a higher degree of complexity, which requires the customer to develop new competencies or acquire new knowledge to reap the full benefits from applying or using the new product (Freel & de Jong, 2009). In many cases, acquiring this knowledge or mastering the new competencies will create a need for close interaction with the supplier (Lundvall & Johnson, 1994). However, the headquarters of more internationalised firms may divert attention from their home base to their subsidiaries (Ambos & Birkinshaw, 2010; Laamanen, 2019) and thus might find it harder to maintain the required high levels of customer interaction (Maehler et al., 2011; Zhang et al., 2015).

This problem is exacerbated when there are higher levels of novelty, because the innovation deviates from conventional technical paths (Afuah, 1998; Scaringella, 2016). The diffusion literature has highlighted that such deviations can be problematic for diffusion (Rogers, 2010), because they negatively affect legitimacy

and customer acceptance. Multinational corporations (MNCs) often try solving this through customer involvement (Zhang et al., 2015). However, higher degrees of internationalisation often render this strategy more complex. Diverting attention away from the home base may thus suggest processes where more novel types of innovation do not diffuse because innovations become less adapted to home-base markets and may therefore suffer from lower consumer acceptance, as well as lower legitimacy. We thus conclude the following:

H3: The effect of employment offshoring on market diffusion of innovation is negative for firms relying on innovations with a higher degree of novelty.

Methodology

The Data

The data used to test the hypotheses is taken from consecutive waves of the Swedish Community Innovation Surveys (CISs) performed in 2009, 2011, 2013 and 2015. The CIS is a bi-annual survey of innovation activities of enterprises in all member states of the European Union (EU) and is mandated by the European Commission. The CIS is based on a stratified random sample of enterprises located in Sweden that have their main economic activity in mining, manufacturing, energy and water supply, sewerage and remediation, wholesale trade, transportation and storage, information and communication services, financial and insurance activities, and other business-oriented services and that have more than 10 employees. According to information from Swedish Statistical Office, the number of firms in the population was approximately 35,000 (20% with product innovations). Of the total population, the CIS covers usually between 4000 and 5000 in each wave. The divergence between the population and the net survey size does not come from low response rates (typically between 60 and 80% due to fines for non-response issued by the Swedish Statistical Office) but results from the fact that only large firms with above 250 employees are fully covered while from smaller ones a random sample is drawn. Besides general business-level characteristics, the CIS includes information on the innovation activities of firms, including, for example, whether the firm introduced product or service innovations. To the CIS, we match data on the activities of Swedish firms abroad, which were taken from the database on Swedish-owned firms with subsidiaries in foreign countries (SVIK). In addition, a firm's level of information, baseline characteristics and financials come from the Swedish business register (FEK). In SVIK and FEK, appropriate lag structures are introduced to harmonise the reference years and to contribute to strengthening the argument that employment offshoring affects innovation and not vice versa. This combined dataset allows for the analysis of whether the degree of offshoring, as measured by the number of employees abroad, systematically affects innovation propensity as well as market diffusion and whether these effects are moderated by the degree of novelty of a firm's innovation.

Identification Strategy

Key Explained and Explaining Variables The difference between innovation propensity and market diffusion of a firm's innovation are two key dependent variables. The first is a variable indicating whether a firm has introduced a product innovation. This variable is binary and takes the value of 1, if a firm successfully introduced at least one product innovation within the last three years (*product innovation*). Following the third revision of the OSLO-Manual (OECD, 2005), a product innovation is defined as a successful market introduction of a new or significantly improved good with respect to its capabilities, user-friendliness, components or subsystems. The second variable resembles the market diffusion of a firm's innovation, as measured by the share of turnover with new products (*market diffusion*). Both variables directly measure innovation output and thereby differ from intermediate measures such as patents (see, for example, Belderbos et al., 2020). While intermediate measures are suitable for capturing “invention”, product innovations and their market diffusion are more in line with the Schumpeterian definition, which requires introduction into the market (Kleinknecht et al., 2002).

The key explaining variable is the number of employees each firm has in foreign locations. While the data provided by Statistics Sweden SCB only relates to firms' activities inside Swedish borders, the SVIK data provides population information on the total number of employees working in subsidiaries abroad, which are owned by Swedish-based firms. This allows creating our key measure of employment offshoring by dividing employees located in foreign locations by the total number of employees at the home base, including all of its subsidiaries (*share employees foreign locations*). In general, H1 and H2 are about the specific relationship between *share employees foreign locations* and *product innovation* in contrast to *market diffusion*.

The moderator in H3 is the degree of novelty in a firm's innovation strategy. We measure this by relying on the information as to whether the firm has introduced new-to-firm or new-to-market innovations or both. We define a variable (*importance market novelties*) as taking on a value of zero if the firm has no innovation, 0.5 if it has a shared strategy and introduced both new-to-firm and new-to-market innovations, and 1 if it introduced only new-to-market innovations.

Control Variables A number of control variables are included that may be relevant in explaining whether a firm is innovation-active or not and which could potentially distort the impact of having employees in foreign locations. To start with, we control for the main input into innovation by including R&D expenditures as a share of turnover (*R&D intensity*). Furthermore, because many studies show that innovation systematically varies by business size, the size of the firm measured by the number of employees (*employees*) is controlled for. To capture the capital intensity of firms, a variable that measures the sum of investment (value in million Swedish krona) in buildings and machines (*physical capital*) is included as well. Physical capital can be important to control because improvements in production technology can be the result of capital-embodied technological change (Castellani et al., 2019). We therefore include a variable for the labour productivity of the firm, which is measured by

total turnover divided by the total number of employees (*productivity*). Productivity can be thought of as a rough proxy of a firm's technological capabilities, which are closely linked to innovation. Finally, to account for general sector differences, we use sector dummies corresponding to the one-digit categories in the NACE industrial classification.

Methodology The two dependent variables are the binary product, the *innovator variable*, and the continuous *market diffusion* variable. For the former, a probit estimator has been used. A seemingly obvious solution for market diffusion would be to use the tobit model, with double censoring at 0 and 100%. This choice is, however, problematic, because tobit models comprise a choice and a conditional linear part and assume coefficient equality across the two parts. Thus, a tobit model combines the two parts, implying that results for the continuous part are driven by innovation propensity. The key interest is precisely in the differences between the dichotomous binary and the ensuing intensity decision. Estimators that are able to treat such a setting appropriately fall into the class of hurdle models and share the characteristic that the binary part (to innovate or not?) and the continuous part (conditional on that the business innovates, how large is the share of turnover from these products?) are not required to have equal coefficients. These hurdle estimators often cause considerable convergence problems. However, in this paper, the full ML Heckman estimator yielded robust results. Heckman models have widely used in strategy research to address issues relating to selection bias. The interpretation can be intricate, but it is clear that the interpretation is then in terms of the latent variable (Certo et al., 2016, Amore and Murtinu 2021). To set up this model robustly, an exclusion restriction is included (Wolffolds & Siegel 2019), where the variable *importance market novelties* is assumed to affect *market diffusion* but not *product innovation*, which should naturally hold by construction. All estimators consider the panel nature of the data by computing standard errors based on clustering on the firm-level.

An important concern that may prevent consistent identification is related to the presence of unobserved heterogeneity. Although our data is particularly rich in a number of respects, not every aspect that may confound the main effects can be directly incorporated. The panel data available in our setting, however, allows us to control for time-constant unobserved heterogeneity by using fixed-effect types of regressions. Because no full fixed-effects estimator for Heckman-types of estimators exists, we include Mundlak correction terms, as proposed for non-linear models by Wooldridge (2005). Mundlak terms are unit-specific time averages of the explaining variables. Including them implies that the coefficients on the time-varying versions are only driven by the year-to-year changes in them, rather than by their levels. Interestingly, the Mundlak correction in non-linear models also has desirable properties with regard to the calculation of the size of the effects. While standard formulae for the marginal effects do not in fact yield the marginal effect, Wooldridge (2005) showed that they still are equal to the average partial effect.

As a robustness check, pre-regression matching approaches were employed, using a first-stage propensity score-matching estimator on an offshoring dummy indicating whether the firms have employees abroad, to homogenise the sample and reduce selection issues in internationalisation decisions. Moreover, we implement a number

of sample splits to probe our results with respect to underlying key assumptions. For example, although CIS is already dominated by small and medium-sized firms, we exclude larger ones because smaller firms focus more on asset-seeking and competence exploring motives (Roza et al., 2011), which makes our theorising about the benefits of employment offshoring more relevant. More details can be found in the section on robustness checks.

Results

Testing the Hypothesis

Table 1 presents descriptive statistics for the key explained and explanatory variables as well as the control variables. We see that 40% of the firms in the CIS sample have introduced new or significantly improved products during the last three years before the survey. The average share of turnover for new products is 3.58%, with a relatively large variance for firms with a zero share, and others where all turnover is due to novel products. The number of employees in foreign locations in the CIS sample is relatively high and averages at 30%. Because the CIS principally addresses a broad population of firms, there is great heterogeneity in terms of firm size. The average firm has 147 employees. Although the largest firm in the sample exceeds 20,000 employees, we see that on average most firms will be small to medium-sized.

Table 2 presents the main results for the full Heckman estimation, with *market diffusion* at the top and *innovation propensity* at the bottom. Models 1 and 2 contain only linear terms for the number of employees abroad. Models 3 and 4 also contain the squared terms. By including only a linear effect in Model 1, we see that a higher number of foreign employees is associated with a higher propensity to innovate. This baseline result also holds when introducing the Mundlak correction for correlated fixed effects in Model 2. When calculating the marginal effects (not displayed), the results indicate that a 10-percentage point increase in the number of foreign employees implies a 3-percentage point increase in the probability of being a product innovator. Given that the average firm in the sample has 30% of its employees abroad, it also means that the average firm is approximately 9 percentage points more likely to be a product innovator than a firm without employees abroad.

While Models 1 and 2 provide positive evidence that, on average, having employees abroad improves innovation performance, we also highlighted that there may be upper thresholds above which further increases in foreign employment shares become dysfunctional. Model 3 (without the Mundlak correction) and Model 4 (with the Mundlak correction) therefore also include the squared term of the number of foreign employees. Indeed, we see that the squared value becomes negative, which implies that the effect of foreign employee numbers on innovation propensity follows an inverted u-shape with an upper optimal threshold. The left panel of Fig. 1 below (plotting the marginal effects) shows that this threshold is slightly above 50% (i.e. the locus where the marginal effect switches from positive to negative). This is more than the average of 30%. Yet, a

Table 2 The innovation effects of foreign locations (Heckman-regressions, raw coefficients)

	(1)	(2)	(3)	(4)
	<i>Market diffusion</i>	<i>Market diffusion</i>	<i>Market diffusion</i>	<i>Market diffusion</i>
Share employees foreign locations	−0.0093 (−0.65)	−0.0102 (−0.72)	−0.0081 (−0.16)	−0.0093 (−0.19)
Square: share employees foreign locations			−0.0000 (−0.01)	−0.0000 (−0.01)
Employees	−0.0002* (−2.15)	−0.0002* (−2.15)	−0.0002* (−2.12)	−0.0002* (−2.12)
R&D intensity	0.2166 (1.28)	0.2926 (1.12)	0.2166 (1.28)	0.2924 (1.12)
Labour productivity	0.0000 (0.19)	−0.0000 (−0.58)	0.0000 (0.18)	−0.0000 (−0.58)
Capital intensity	0.2864*** (11.80)	0.2846*** (12.42)	0.2864*** (11.81)	0.2846*** (12.49)
Importance market novelties	2.9446*** (4.93)	2.9312*** (4.92)	2.9427*** (4.93)	2.9292*** (4.91)
Constant	16.7156*** (19.15)	16.5924*** (18.75)	16.6856*** (19.07)	16.5680*** (18.72)
	<i>Innovation propensity</i>	<i>Innovation propensity</i>	<i>Innovation propensity</i>	<i>Innovation propensity</i>
Share employees foreign locations	0.0095*** (8.90)	0.0095*** (8.91)	0.0293*** (8.93)	0.0293*** (8.92)
Square: share employees foreign locations			−0.0003*** (−6.32)	−0.0003*** (−6.30)
Employees	0.0001* (2.24)	0.0001* (2.21)	0.0001* (2.37)	0.0001* (2.34)

Table 2 (continued)

	(1)	(2)	(3)	(4)
R&D intensity	−0.0000 ^{***} (−9.17)	−0.0000 ^{***} (−9.54)	−0.0000 ^{***} (−8.91)	−0.0000 ^{***} (−9.30)
Labour productivity	−0.0000 (−1.86)	−0.0000 [*] (−2.02)	−0.0000 [*] (−2.05)	−0.0000 [*] (−2.17)
Capital intensity	−0.0007 (−1.07)	0.0004 (0.10)	−0.0006 (−1.16)	0.0007 (0.16)
Constant	0.3422 ^{***} (10.89)	0.3430 ^{***} (10.91)	0.3419 ^{***} (10.84)	0.3427 ^{***} (10.86)
Year dummies	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes
Mundlak FE-correction	No	Yes	No	Yes
Observations	9102	9102	9102	9102
#Firms	6042	6042	6042	6042
T-stat: indep. eqs.	−1.73	−2.03 [*]	−1.25	−1.60

t statistics in parentheses^{*} $p < 0.05$ ^{**} $p < 0.01$ ^{***} $p < 0.001$

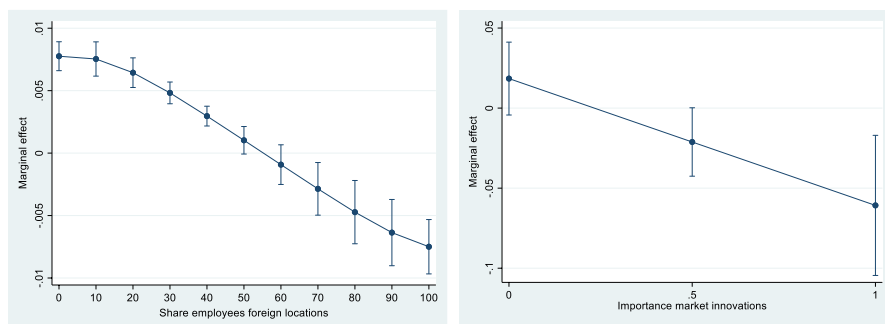


Fig. 1 The effects of foreign locations (left: product innovations as a function of share of employees at foreign locations, right: market diffusion as function of market innovations)

substantial number of firms in the sample are above that threshold, implying that they are placed on the downward-sloping part of the inverted u-shape.

Turning to the effects on *market diffusion* (top of Table 2), we see instead that the share of employees abroad is insignificant in any of the four models. Thus, we do not find any evidence that the number of international employees has any robust effect (linear or u-shaped) on market diffusion. Overall, thus H1 is corroborated but only for innovation propensity, i.e. the likelihood of introducing product innovation. This finding is consistent with H2, which claimed that the effects are weaker for market diffusion. In fact, the results are not only smaller in size, but also do not appear to have any effect at all.

In H3, it was argued that a firm's reliance on more novel product innovations will increase the negative effects on market diffusion by having employees abroad. In Table 3, we test this hypothesis by combining the *share employees at foreign locations* with the *importance market novelties*. Again, the effects on innovation propensity are at the bottom of the table, and the effects on market innovation are at the top. As before, the results follow an inverted u-shape for innovation propensity. However, now there appears a robustly negative effect on the interaction between innovation and the number of employees abroad and the importance of market novelty in market diffusion regression. It is also interesting to observe that the linear baseline term of the market novelty variable is consistently positive, implying that businesses that place more emphasis on market novelty are generally associated with improved diffusion. The negative effect on diffusion thus only occurs in an international context.

To obtain a more precise picture of the marginal effects, the marginal effects of the share of foreign employees are plotted as a function of the importance of market novelties in the right panel of Fig. 1. We see that for those with a greater focus on market novelties, a higher share of employees abroad is associated with a reduction in the share of turnover with new products (*market diffusion*). For businesses with an intermediate focus on market novelties, the effect is significantly negative at the 5% level. For those with a greater focus on market novelties, it is significant at the 1% level.

Table 3 The innovation effects of foreign locations (Heckman regression w. interaction importance market novelties, raw coefficients)

	(1)	(2)
	<i>Market diffusion</i>	<i>Market diffusion</i>
Share employees foreign locations	0.0122 (0.41)	0.0103 (0.35)
(Share employees foreign locations)*(importance market novelties)	−0.0765** (−2.75)	−0.0758** (−2.72)
Square: share employees foreign locations	0.0001 (0.24)	0.0001 (0.26)
Importance market novelties	9.2181*** (7.96)	9.1826*** (7.91)
Employees	−0.0001 (−0.97)	−0.0001 (−1.00)
R&D intensity	0.2233 (1.24)	0.3240 (1.15)
Labour productivity	−0.0000 (−0.43)	−0.0000 (−1.51)
Capital intensity	0.3064*** (11.67)	0.3042*** (12.81)
Incrementality	97.0626*** (38.87)	97.1334*** (39.04)
Constant	1.7841 (1.70)	1.6640 (1.57)
	<i>Innovation propensity</i>	<i>Innovation propensity</i>
Share employees foreign locations	0.0293*** (8.93)	0.0293*** (8.92)
Square: share employees foreign locations	−0.0003***	−0.0003***

Table 3 (continued)

	(1)	(2)
Employees	(-6.32) 0.0001*	(-6.30) 0.0001*
R&D intensity	(2.37) -0.0000***	(2.34) -0.0000***
Labour productivity	(-8.90) -0.0000*	(-9.30) -0.0000*
Capital intensity	(-2.05) -0.0006	(-2.17) 0.0007
Constant	(-1.16) 0.3417***	(0.16) 0.3425***
Year dummies	(10.88) Yes	(10.90) Yes
Sector dummies	Yes	Yes
Mundlak FE-correction	No	Yes
Observations	9102	9102
#Firms	6042	6042
T-stat: indep. eqs.	-2.19*	-2.41*

t statistics in parentheses* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Further Results and Robustness Checks

We have tested a number of alternative specifications in order to address the robustness of the results. First, a concern about consistent identification of the models in Tables 2 and 3 may be that the sample of internationalisation-active firms may be quite different from purely domestic firms. *A priori* existing drastic differences in the samples raise a number of concerns about endogeneity issues resulting from selection and self-selection. In particular, if omitted variables drive both selection into innovation and foreign employment, a positive correlation between the two variables may be spurious. One way to deal with the resulting heterogeneity is to apply pre-regression matching procedures to homogenise the samples. If the included and the omitted variables are sufficiently correlated, pre-regression matching can be expected to eliminate or at least reduce estimation biases. Here, a pre-regression matching based on R&D activity to homogenise the degree of a firm's innovation inputs was employed. In the first stage, we used a propensity score matching estimator on the dummy indicating whether the firm has any employees abroad to create a control group. In the second stage, we ran the regression models as before but restricted the sample to the treatment and control group, dropping any observations unmatched in the propensity score model. In Table 4, the results of this pre-regression matching approach are presented, where for the sake of brevity only the most general results using the interaction term *importance of market novelties* are reported. The results, in any case, do not appear to be strongly affected, with baseline, squared and interaction effects being largely unchanged.

Secondly, one objection relates to an implicit assumption in the theory. In particular, the alleged benefits of offshoring are likely to be stronger when firms are asset seeking. From the literature, we know that this is likely to be the case for small to medium-sized firms. Larger firms instead tend to be asset exploiting (Roza et al., 2011). Although our sample is heavily dominated by small to medium-sized firms, we have also run a robustness check excluding all firms with more than 499 employees. The results are qualitatively unaffected. It seems nonetheless to be important to stress that the low number of larger firms in the sample limits the ability to test explicitly whether the results also hold for large when considered in isolation. At the very least, the results will hold for smaller and medium-sized firms.

A final check pertains to the question as to whether the results apply to all sectors alike. In Tables 2 and 3, businesses from all sectors were included, while paying little attention to potential differences. In Table 5, differentiation results between services and manufacturing businesses are presented. While results may also differ between more detailed sector differentiations, the difference between services and manufacturing may be particularly relevant because both innovation strategies (because of the intangibility of the offer) and internationalisation strategies (because of reduced tradability) may differ between firms. We see that the curvilinear relationship relating to innovation propensity is robustly stable for both manufacturing and services, irrespective of whether Mundlak corrections (Models 1 and 2) are included or not (Models 3 and 4). However, we see that the negative interaction effect between the number of employees abroad and the importance of new-to-market innovation on

Table 4 The innovation effects of foreign locations (Heckman regression with pre-regression matching, raw coefficients)

	(1)	(2)
Share employees foreign locations	<i>Market diffusion</i> 0.2749 (0.50)	<i>Market diffusion</i> 0.1960 (0.46)
(Share employees foreign locations)*(importance market novelties)	−0.0826* (−2.20)	−0.0804* (−2.38)
Square: share employees foreign locations	−0.0022 (−0.43)	−0.0015 (−0.39)
Importance market novelties	5.7357*** (3.82)	5.6425*** (4.37)
Employees	0.0003 (0.29)	0.0002 (0.20)
R&D intensity	0.1371 (0.33)	0.1771 (0.18)
Labour productivity	−0.0000 (−0.10)	−0.0000 (−0.21)
Capital intensity	0.4127 (0.05)	0.7230 (0.19)
Constant	−17.3425 (−0.37)	−10.5174 (−0.29)
	<i>Innovation propensity</i>	<i>Innovation propensity</i>
Share employees foreign locations	0.0320*** (7.65)	0.0320*** (8.27)
Square: share employees foreign locations	−0.0003***	−0.0003***

Table 4 (continued)

	(1)	(2)
Employees	(-5.60) 0.0001 (1.64)	(-6.08) 0.0001 (1.21)
R&D intensity	-0.0000 (-0.00)	-0.0000 (-0.00)
Labour productivity	-0.0000 (-0.77)	-0.0000 (-0.21)
Capital intensity	-0.1222 (-0.55)	-0.1238 (-0.50)
Constant	-1.4234*** (-7.18)	-1.4256*** (-8.45)
Year dummies	Yes	Yes
Sector dummies	Yes	Yes
Mundlak FE-correction	No	Yes
Observations	6645	6645
#Firms	4411	4411
T-stat: indep. eqs.	0.45	0.40

t statistics in parentheses* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 5 The innovation effects of foreign locations (Heckman regressions, manufacturing vs. services, raw coefficients)

	(1)	(2)	(3)	(4)
	<i>Market diffusion (manufacturing)</i>	<i>Market diffusion (services)</i>	<i>Market diffusion (manufacturing)</i>	<i>Market diffusion (services)</i>
Share employees foreign locations	0.1264 (1.17)	0.9964 (0.12)	0.1195 (1.34)	-0.3552 (-0.07)
(Share employees foreign locations)* (importance market innovations)	-0.0602*	-0.1406	-0.0621*	-0.1298
Square: share employees foreign locations	(-2.12) -0.0008	(-0.67) -0.0138	(-1.96) -0.0008	(-0.60) 0.0063
Importance market novelties	(-0.88) 3.8943**	(-0.12) 11.8840	(-0.85) 3.9692**	(0.08) 11.6670
Employees	(3.26) 0.0003	(1.73) 0.0003	(3.07) 0.0002	(1.64) -0.0001
R&D intensity	(0.48) 0.5235	(0.03) 0.1994	(0.50) 0.8668	(-0.03) 0.2545
Labour productivity	(1.09) 0.0000	(0.13) -0.0000	(0.41) -0.0000	(0.12) -0.0000
Capital intensity	(0.02) 0.2752	(-0.05) -7.1014	(-0.05) 0.2827	(-0.29) -4.1452
Constant	(0.24) 8.9891	(-0.27) 5.5717	(0.21) 9.4335	(-0.27) 22.0553
	(1.26) <i>Innovation propensity</i>	(0.06) <i>Innovation propensity</i>	(1.77) <i>Innovation propensity</i>	(0.34) <i>Innovation propensity</i>
Share employees foreign locations	0.0285*** (6.81)	0.0725*** (5.68)	0.0288*** (7.39)	0.0724*** (4.72)
Square: share employees foreign locations	-0.0002***	-0.0011***	-0.0002***	-0.0011***

Table 5 (continued)

	(1)	(2)	(3)	(4)
Employees	(−4.78) 0.0003** (3.16)	(−5.74) 0.0000 (0.30)	(−5.08) 0.0003** (3.28)	(−4.59) 0.0000 (0.28)
R&D intensity	0.0071 (0.01)	−0.0000 (−0.00)	0.4957 (0.31)	−0.0000 (−0.00)
Labour productivity	−0.0000 (−0.25)	−0.0000 (−1.01)	−0.0000 (−0.21)	−0.0000 (−1.09)
Capital intensity	−0.0036 (−0.01)	−0.1559 (−1.23)	−0.0002 (−0.00)	−0.1602 (−1.32)
Constant	−0.7752*** (−7.61)	0.1824 (1.66)	−0.7883*** (−8.42)	0.1855 (1.66)
Year dummies	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes
Mundlak FE-correction	No	No	Yes	Yes
Observations	6395	2707	6395	2707
#Firms	4129	1929	4129	1929
T-stat: indep. eqs.	1.02	0.10	1.29	−0.10

t statistics in parentheses

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

market diffusion is visible only in manufacturing. This suggests that we can verify H3 only for manufacturing, while the effects may be less important in services.

Discussion and Conclusion

In this paper, we provided empirical evidence that the increasing integration into global value chains (Kano et al., 2020) can provide important benefits to businesses, not only in terms of cost reductions or increased productivity but also in terms of innovation for home-based operations. The positive effects, however, largely apply to product innovation propensity and for low to moderate levels of employment offshoring, while for excessive levels negative effects were documented. An important observation is that the results do not generalise to market diffusion of innovation, where employment offshoring does not seem to play a significant role.

The findings thus provide a mixed picture of the relationship between employment offshoring and a firm's level of innovation. It appears that the effects are most important for the pre-diffusion phase, with the potential to include the invention and transformation of this invention into an implemented product. For this, we document a non-linear inverted u-shape effect. The results are thus in line with arguments from the literature analysing the motives for internationalisation, which suggests that an important reason for being active internationally is to tap into globally dispersed knowledge sources (Cuervo-Cazzura et al., 2015; Meyer, 2015; Hervás-Oliver & Albors-Garrigos, 2008; Scott-Kennel & Saittakari, 2020). In this respect, the results are also consistent with views that stress that multinational enterprises (MNEs) act as global disseminators and hubs of knowledge (Kogut & Zander, 2003; Mudambi & Swift, 2012); at the very least, it suggests that MNCs are able to access globally dispersed knowledge and make use of it to boost their own innovation propensity.

At the same time, the presented results were indicative of important sources of costs associated with offshoring. One stream of the literature has focused on costs resulting from managerial complexity (Fifarek et al., 2008; Baier et al., 2015), which could endanger the ability to innovate successfully. Alternatively, Ceci and Prencipe (2013) have warned that international offshoring may exacerbate principal-agent problems that result from the reduced effectiveness of monitoring. Although unable to identify the sources of the costs that are implied by excessive offshoring (Mihalache et al., 2012; Baier et al., 2015), in this paper it was possible to document that costs and benefits exist and thereby provide further evidence that they should be a primary concern for businesses considering internationalisation.

Moreover, by not focusing on internationalisation of innovation, but rather on the employment offshoring, it may also stand to reason that the costs in terms of reduced innovation activities may not have been anticipated. One of the mechanisms that may drive such unanticipated costs is that offshoring may unintentionally reduce the embeddedness in innovation networks at the home base (Baier et al., 2015). This heeds the call that firms need to consider the side effects on innovative capacity, even when international activities appear to be not directly related to innovation. As pointed out by Schubert & Tavassoli (2020), innovation is a process that spans

multiple business functions, and changes in functions such as sales or marketing may have implications for innovative capacity in general.

Going beyond the inverted u-shape relationship between innovation and employment offshoring, the central contribution of this paper is the emphasis on the need to distinguish between innovation propensity and market diffusion. While there is a classic, well-established literature on this distinction in innovation studies (Kamien & Schwartz, 1972; Rogers, 1976; Rosenberg & Mowery, 1979; Newell et al., 2000; Rogers, 2010; Oorschot et al., 2018), this aspect appears to be absent from the literature on offshoring-innovation-relationship in IB, which, when only referring to diffusion, focused on the analyses and practice of knowledge diffusion within the boundaries of the MNC (Minbaeva et al., 2005; Minbaeva et al., 2014; Ishihara & Zolkiewski, 2017). The core result that the inverted u-shape does not extend to market diffusion indeed shows that such a distinction is utterly necessary. In fact, instead of documenting any positive effects of the number of employees abroad, we show that the effects are plainly negative when a firm relies more strongly on novel product innovations.

Overall, the results contribute to the literature dealing with the offshoring-innovation nexus by providing a more nuanced picture. Increasingly, authors have warned against the costs of internationalisation of innovation, which may play out if the firm becomes excessively internationalised. This claim has usually been modelled by testing for inverted u-shapes. While we corroborate these findings for the innovation propensity, we additionally show that the picture may be considerably less favourable for market diffusion. This has important implications for management practice, because it means that businesses must strategically differentiate internationalisation motives aimed at increasing their innovation capabilities (Cuervo-Cazurra et al., 2015), for example, by driving innovation propensity by gaining access to untapped knowledge sources on the one hand (Almeida & Phene, 2008; O'Dwyer & O'Flynn, 2005; Felker, 2012; Bos et al., 2017) and, on the other hand, motives related to achieving greater market diffusion. In fact, it was shown that under certain circumstances, both these goals might be in conflict with each other. On a theoretical level, the results mean that there is a pressing need to better understand the innovation creation and the diffusion of innovation processes in an international setting. The presented finding that employment offshoring may make the diffusion of novel product innovations more complicated suggests that interactive learning (Rosenberg, 1982) may indeed be an important ingredient. If that turns out to be true, the results can be understood as reinforcing the call that MNCs need to become ambidextrous in the sense of globally integrating the full range of dispersed knowledge sources and become locally embedded to ensure diffusion (Newbury, 2001; Boehe, 2007; Marin & Bell, 2010) at the same time.

The study has two important limitations, which open up potential avenues for future research. First, the employed data provides little indication as to the type of interactions taking place at foreign subsidiaries. Thus, on the one hand, there is little knowledge on how firms in the sample embed in their environments and, on the other, how they organise or manage their global linkages. This information is crucial in understanding how diffusion of innovation as opposed to innovation generation is likely to be facilitated or hampered by international offshoring. Ultimately,

to develop more detailed models of how international offshoring differently affects innovation propensity and market diffusion requires more in-depth and probably more qualitative information on how the chain of innovation processes is managed by MNCs.

Second, the dataset did not allow to directly measure the benefits and costs of internationalisation on innovation propensity and the market diffusion of innovation. By focusing on general employment offshoring, the data also does not allow inference on the type of business activities that are offshored. While this constitutes an analytical shortcoming and limits the ability to differentiate between activities, it has also the strength of providing an overall measure of offshoring. In fact, most studies have focused on offshoring of innovation (Fifarek et al., 2008; Nieto & Rodriguez, 2011; Rodriguez & Nieto, 2016; Steinberg et al., 2017; Valle et al., 2015) but have not analysed what general offshoring implies for a firm's level of innovation. Thus, this second limitation may also be understood as a particular strength of this analysis, avoiding a narrow issue focus on innovation offshoring.

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Declarations

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