Institutions and the Diversity and Prevalence of Multinationals' Knowledge-Augmenting Subsidiaries

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Abstract: Multinational corporations increasingly seek to gain access to, and exploit, locationally specific sources of advanced knowledge and technological capabilities, creating a need to explain 1) the diversity amongst these facilities and 2) how institutions influence MNCs' abilities to invest in different subsidiary types. Extending debates on firms' knowledge-augmenting activities, we integrate institutions into our analytical framework to a greater extent than previous work has done. Moreover, existing contributions provide typologies of *R&D* subsidiaries. In contrast, we focus on a particular subset of subsidiaries, *knowledge-augmenting* ones, and put forward a theory to explain their variety and their prevalence, enabling us to identify previously neglected subsidiary types that have important managerial and policy implications. By downplaying the diversity of these subsidiaries, existing work has not been able to capture the full range of managerial challenges as well as the costs and benefits of different subsidiary types to host countries. We, therefore, problematize firms' abilities to gain access to foreign knowledge-generating assets, highlight the importance of institutional environments, provide policy recommendations and identify areas for future research.

Keywords: knowledge; internationalization of R&D; subsidiary embeddedness; institutions; comparative capitalisms

Introduction

Companies' desire to gain access to, and exploit, superior sources of knowledge generation, including research centres and talented individuals, that are unavailable elsewhere increasingly drives the establishment of knowledge-production facilities abroad (Chiva, Ghauri, & Alegre, 2014; Kristensen, 2016). Existing typologies of these subsidiaries usually encompass facilities that exploit as well as those that augment the MNC's current R&D knowledge (Kuemmerle, 1999a, 1999b; Manolopoulos, Söderquist, & Pearce, 2011). Consequently, there is a need to distinguish further between, and to explain, the increasing number and types of knowledge-augmenting subsidiary. We develop a theory to explain the diversity and prevalence of this group of subsidiaries.

Building on Kuemmerle (1999a), we define knowledge-augmenting subsidiaries as firms' investments abroad to access and develop unique or rare knowledge-generating resources that are locationally specific and that can provide technical and/or research-related knowledge that is new to the firm and is likely to be tacit in nature. Although the subsidiary may combine local resources with existing knowledge from other parts of the company, such subsidiaries do not primarily exploit existing firm capabilities.

To make these distinctions, we use the concepts of internal (company) and external (local) embeddedness (Andersson & Forsgren, 2000; Heidenreich, 2012). Drawing on Andersson and Forsgren's (2000: 339) work that defines and operationalizes the concept of 'technological embeddedness', we refer to a subsidiary's internal knowledge-augmenting embeddedness as the interdependencies and mutual adjustments that the overseas subsidiary and its network *within* the wider MNC make to create and develop the subsidiary's knowledge resources. Similarly, a subsidiary's external knowledge-augmenting embeddedness reflects how mutually adaptive the subsidiary and its network of local actors are to enhance the subsidiary's technical and research-related knowledge.

We argue that internal and external embeddedness are independent from one another: a subsidiary's level of internal embeddedness does not determine its level of external embeddedness. Consequently, we put forward a novel typology of knowledge-augmenting subsidiaries that captures a greater range of subsidiaries and highlights the important differences between them more clearly than existing work does. Our first contribution is, therefore, to capture the variety of knowledge-augmenting subsidiaries that exist.

Previous typologies tend to assume that knowledge-augmenting subsidiaries can readily gain access to key knowledge either directly or via spillovers (Kuemmerle, 1999b; Manolopoulos et al., 2011). However, increasing competition from emerging-market MNCs and the role that governments in various locations often play in creating sources of advanced knowledge generation within their borders have made foreign companies' access to them increasingly difficult (Sauvant, 2009; U.S. Department of State, 2015). Our second contribution is, hence, to show how institutions influence the availability of knowledge-augmenting resources and, thereby, to problematize foreign firms' abilities to acquire or generate knowledge in host countries.

The existing literature tends to assume that institutions act as an incentive structure that is external to firms and that drives MNC behaviour (Belderbos, Leten, & Suzuki, 2013); this downplays how institutions both constitute and regulating firm behaviour. Drawing on the comparative capitalisms literature (Brewster, Wood, & Goergen, 2015; Kristensen, 2016), we demonstrate how institutions 1) influence firms' variable natures and 2) moderate the relationships between different collective actors, including firms' abilities to share authority with, and gain the commitment of, those subsidiary employees who are directly involved in knowledge-augmenting activities and who could be researchers, designers, engineers as well as manual workers if they contribute skills and expertise that is difficult to find in other locations. Our third contribution, therefore, is to show how institutional systems shape firms'

abilities 1) to establish different types of knowledge-augmenting subsidiaries and 2) to manage the different levels and forms of subsidiary embeddedness associated with each subsidiary type (Hughes, Powell, Chung, & Mellahi, n.d.; Morgan, Kelly, Sharpe, & Whitley, 2003).

Whilst the innovation systems literature has provided rich taxonomies and studies of the interactions between different institutions, knowledge bases, technological regimes, channels of knowledge diffusion, organizational forms and industry sectors to explain developments in innovation patterns and the location of distinct knowledge-generating activities (Asheim & Coenen, 2005; Dosi, 1993; Lundvall, 2007; Malerba, 2002), our understanding of the institutional conditions that are necessary to support different firms' investments in varying institutional systems to advance their knowledge remains limited (Allen, 2013).

By examining how institutions shape firms' investments overseas to establish and develop knowledge-augmenting capabilities, we note MNCs' *capitalist* nature. On the one hand, this means that firms attempt to generate and exploit knowledge that is likely to be profitable, leading to a focus on some forms of knowledge and not others, and highlighting the systemic influences on capitalistic firms' (in)ability to create different types of knowledge. On the other hand, the variable nature of capitalist systems means that firms from any particular institutional regime will, compared to companies from contrasting institutional settings, 1) have higher or lower pressures on them to develop knowledge-augmenting capabilities abroad (Witt & Lewin, 2007) and 2) be able to do so to different degrees (Whitley, 2012).

We focus, then, on how institutions shape MNCs' abilities to invest in different location-specific forms of knowledge. We do not seek to examine how different knowledge and industry characteristics (Asheim & Coenen, 2005; Malerba, 2002) shape MNCs' abilities

to transfer advanced knowledge from one location to another within the firm (Kristensen & Morgan, 2007). Similarly, whilst we recognize that MNC entry modes are likely to influence the subsidiary's embeddedness, the firm's willingness to share authority with key personnel abroad, institutional specificities, and access to foreign assets (Meyer, Estrin, Bhaumik, & Peng, 2009), we do not analyse these here. We do note that acquisitions and joint ventures are more likely than greenfield investments to provide an MNC with quicker access to locally embedded knowledge (Lam, 2003) .

The paper's next section assesses how internal and external embeddedness are related, sets out our subsidiary classification, and analyses how the different types of knowledge-augmenting subsidiary influence MNCs' requirements to share authority with, and seek to gain the commitment of, key subsidiary employees. The subsequent sections discuss how institutions influence investments in knowledge-augmenting capabilities, starting with the role of the state before examining how institutions shape firms' abilities to manage different levels of internal and external embeddedness. The final section concludes.

Internal and external embeddedness, and the development of knowledge-augmenting capabilities: The role of authority sharing and employee commitment

Several R&D typologies highlight the possibility that internal and external embeddedness are sometimes, in a broad sense, inversely related (Kuemmerle, 1999a), arguing that some subsidiaries that augment knowledge have high levels of external and low levels of internal embeddedness (Andersson & Forsgren, 2000; Kuemmerle, 1999a; Sölvell & Zander, 1998), leading, in our terminology, to 'global vanguard subsidiaries'. As other frameworks note, subsidiaries can have high levels of internal and external embeddedness (Manolopoulos et al., 2011), leading to 'networked' subsidiaries.

Extending existing typologies, we argue that internal and external knowledge-augmenting embeddedness are independent from one another, enabling us to identify two previously overlooked and counter-intuitive types of knowledge-augmenting subsidiary. First, some knowledge-augmenting subsidiaries are weakly embedded locally, but are strongly embedded within the MNC, leading to 'parent company outposts'. Second, some knowledge-augmenting subsidiaries may be relatively weakly embedded internally and externally (Foss & Pedersen, 2001); these 'free spirits' are largely self-sufficient and require little input from other actors to enhance their capabilities.

As we argue below, the degree to which multinationals need to share authority with, and gain the commitment of, employees in the foreign knowledge-augmenting subsidiary will depend on the subsidiary's levels of internal and external embeddedness to generate valuable knowledge. Complementing existing, broader taxonomies, Figure 1 sets out our typology of knowledge-augmenting subsidiaries and associated levels of authority sharing and employee commitment.

Figure 1. Types of knowledge-augmenting subsidiaries, authority sharing, organizational careers, and stock options

Internal (Company) Embeddedness	External (Local) Embeddedness: Low	External (Local) Embeddedness: High
High	**Parent company outpost** Authority sharing: low Organizational careers: limited Stock options: limited	**Networked subsidiaries** Authority sharing: some Organizational careers: some Stock options: high
Low	**Free spirits** Authority sharing: high Organizational careers: limited Stock options: high	**Global vanguard subsidiaries** Authority sharing: high Organizational careers: some Stock options: high

We put this typology forward as a collection of ideal types. Reality will be more complex. Actual subsidiaries may carry out a range of knowledge-generating activities, leading, potentially, to two subsidiary *types* within one actual subsidiary (Frost, Birkinshaw, & Ensign, 2002); in this situation, we would expect different groups of subsidiary employees that carry out distinct activities to exhibit varying degrees of embeddedness, reflecting their requirements to interact with local and/or other MNC actors.

Moreover, a subsidiary's internal and external knowledge-augmenting embeddedness are dynamic (Kristensen, 2016; Morgan & Kristensen, 2006); the parent company may not, because of incomplete information and subsidiary opportunism, co-ordinate or fully control a subsidiary's internal or external embeddedness (Morgan & Kristensen, 2006); and power

asymmetries and micro-politics within MNCs will moderate how head-office's strategic decisions translate into subsidiary objectives and practices (Becker-Ritterspach & Dörrenbächer, 2009).

By focusing on these distinct subsidiary types, we aim to show how institutions influence the existence of different types of subsidiary and firms' abilities to acquire knowledge-augmenting capabilities abroad. Consequently, we highlight the causal mechanisms that help to explain patterns of firms' investments in knowledge-augmenting subsidiaries overseas and address the types of subsidiaries that exist holistically.

Multinationals' ability to develop knowledge-augmenting capabilities overseas will often, but not always, as we will show, depend on host-country managerial, research and operational staff being willing and able to contribute to the on-going development and creation of knowledge; in general, the more willing employers are to delegate authority to overseas employees and to seek to encourage key employees to stay with the firm, the more likely those employees are to commit their skills and expertise to the development of the firm's knowledge (Asakawa & Som, 2008; Benton & Magnier-Watanabe, 2012; Harcourt & Wood, 2007).

Authority-sharing is the delegation of discretion to employees over how they perform and organize their work so that they are involved in problem-solving activities and contribute to the organization's performance (Whitley, 2005a, p. 236). We extend this definition of authority sharing to cover the activities of employers who create, and delegate the resolution of, challenging tasks/jobs to employees (to attempt) to recruit and retain highly skilled workers (Kristensen & Morgan, 2012, p. 426). Authority sharing can occur outside the firm's boundaries, when a company is embedded within inter-organizational networks, potentially enabling actors in the network to learn from one another (Vlaisavljevic, Cabello-Medina, &

Pérez-Luño, 2016). Authority sharing, in this sense, will mean that the subsidiary's managers can decide how to respond to, and initiate, change within its host-country network(s).

Employers can encourage employees' commitment and contributions to knowledge generation by seeking to tie key employees to the firm. One way to do this is to offer them long-term employment and promotion; that is, by establishing organizational careers for at least some skilled subsidiary employees (Whitley, 2005a, p. 237). Firms that do not require such commitment are unlikely to have such policies (Morgan et al., 2003; Whitley, 2005a). Another way to bind key employees to a firm and to gain their commitment to its knowledge-generating activities, especially when skilled-labour mobility is high, is to provide financial incentives, such as stock options (Casper, 2007, p. 53).

Whilst some combinations of authority sharing and organizational careers are feasible, others are less so: authority sharing is a necessary, not a sufficient, condition for long-term organizational careers, meaning that high levels of authority sharing do not automatically imply that some employees will have organizational careers. However, MNCs are unlikely to offer long-term careers to subsidiary staff without sharing authority with them (Whitley, 2005a, p. 257),

Parent company outposts will be run as appendages of the multinational, reflecting the subsidiary's role in accessing a host-country subsidy (Wilson, 2009), testing facilities, less restrictive health or environmental regulations (Müller, Fujiwara, & Herstatt, 2004; Witt & Lewin, 2007), or lower-cost talent (Manning, Sydow, & Windeler, 2012). Because parent company outposts take advantage of an aspect of a host-country's innovation system that does not require the subsidiary to be strongly embedded locally, any local personnel are unlikely to have much authority and will probably not have organizational careers or stock options. Indeed, strong external embeddedness may result in undesirable knowledge spillovers (Lorenzen & Mahnke, 2002), increasing the likelihood that important knowledge

and resources, including managers and skilled employees, will come from the rest of the multinational.

Our 'parent company outposts' share some characteristics with 'branch plants': both are weakly embedded locally. However, a typical trait of branch plants is the absence of high-value added, knowledge-generating activities (Phelps, 2009). Within our framework, we expect company outposts, by definition, to conduct such activities, potentially including R&D, engineering or product and process innovations.

An MNC that established a low-cost, knowledge-augmenting engineering centre in Romania illustrates this point. As the technical standards of local universities were out-dated, the MNC collaborated with one of them to improve the quality of local engineers. Rejecting offers from the university to conduct joint R&D projects, the MNC focused solely on training to reduce costs by employing lower-cost engineers; thus, the subsidiary's external embeddedness remained limited. Moreover, the subsidiary lacked autonomy and relied on knowledge transfers from the MNC (Manning et al., 2012).

To augment their knowledge, *networked* subsidiaries need to be able to respond to, and initiate, changes within their local and MNC networks, requiring subsidiary staff to have some decision-making powers to adapt locally (Gassmann & von Zedtwitz, 1999); however, the need to collaborate with other units in the MNC limits the independence of subsidiary employees. As Manolopoulos et al.'s (2011) work demonstrates, networked subsidiaries have some autonomy, as they are comparatively free to make strategic and operational decisions on their own, but do not have complete discretion.

Global vanguard subsidiaries collaborate primarily with local actors rather than MNC units to generate valuable information and are likely to have global product mandates (Sölvell & Zander, 1998). Consequently, the rest of the organization is more dependent on the subsidiary than vice versa. Subsidiary employees are, therefore, likely to have extensive

decision-making powers so that they can respond to, and help to create, changes in their local networks, requiring the multinational to retain subsidiary staff and to encourage them to contribute to learning within the organization as a whole and, hence, to bind some of them to the subsidiary.

Roche's recent purchase of Genentech to augment its knowledge based on that embodied and embedded within Genentech and its local networks illustrates these arguments. Genentech employees have considerable decision-making powers, more generous long-term stock options than other Roche employees and some of them have the possibility of an organizational career with a few senior Genentech employees becoming Roche executives (Jack, 2009a, 2009b).

Free spirits do not rely much on the rest of the MNC or local organizations to enhance their knowledge. They are weakly embedded internally and externally; this does not mean, however, that they do not have any ties to the rest of the company or to local organizations. However, these ties are limited and do not involve the transfer of important knowledge to the subsidiary. By definition, free spirits are likely to operate in highly specialized and cutting-edge innovation and knowledge fields, and have very skilled employees who can generate important new knowledge either individually or in relatively small groups, hindering other actors' abilities to understand at a fundamental level what those employees do, and why and how they do it. Consequently, subsidiary employees are likely to have much autonomy and financial incentives, but may not have organizational careers.

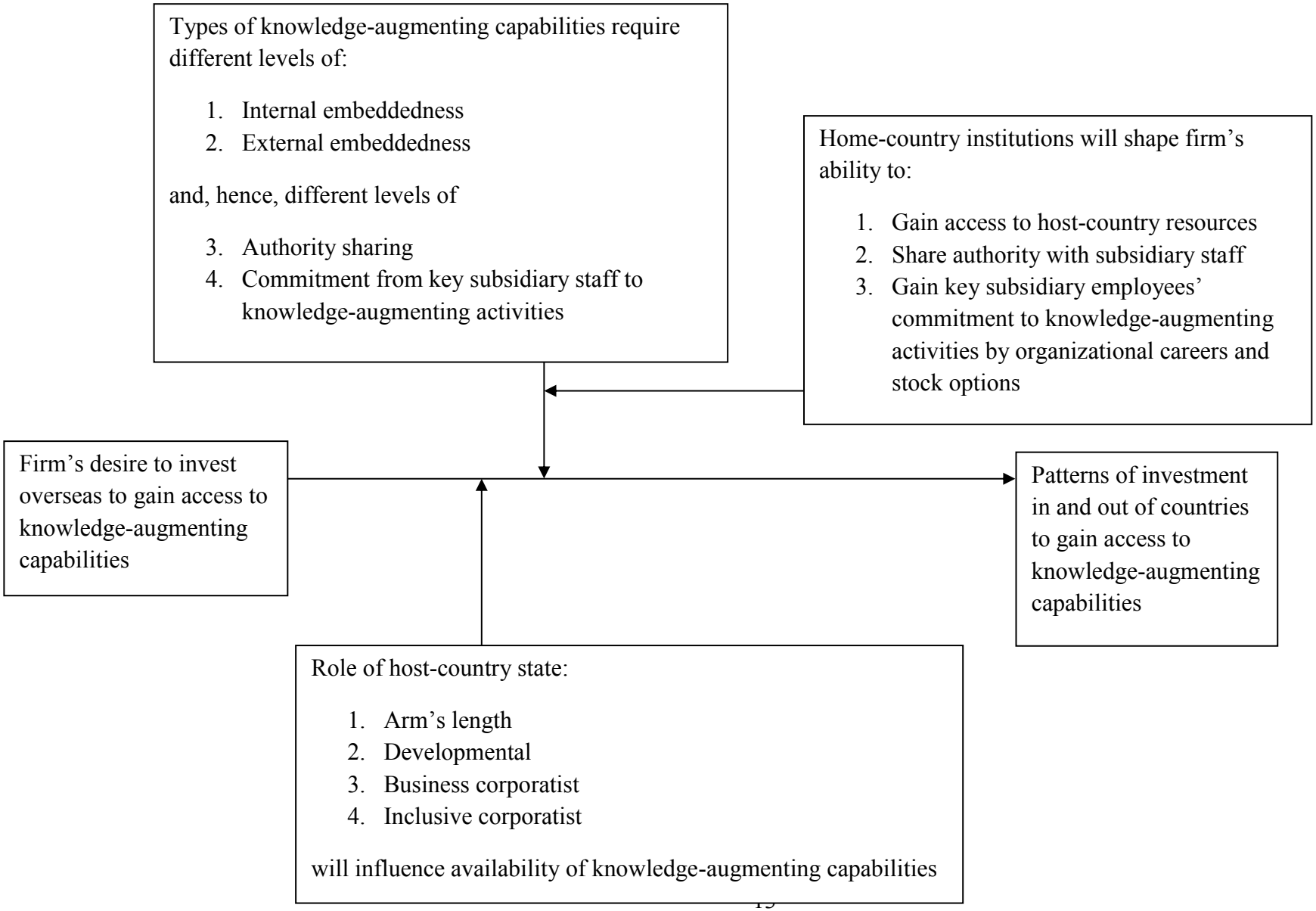
Google's acquisitions of Oxford-based artificial-intelligence (AI) companies, such as DeepMind, exemplify free spirit subsidiaries. The number of AI experts is low, perhaps only 50 worldwide (Regalado, 2014), making the formation of global and local networks to a large number of diverse actors difficult. This situation may not last very long: using links to Oxford University, DeepMind aims to enhance the number of AI specialists (Ahmed, 2014).

Google's AI subsidiaries have decision-making powers: DeepMind employees can determine the use of some of Google's other employees and resources (Ahmed, 2014; Regalado, 2014). Indeed, DeepMind rather than Google was behind the establishment of an ethics board to regulate how Google, as a whole, will use AI (Inofuentes, 2014; Simonite, 2015, p. 18), indicating that the subsidiary has important discretionary powers.

Institutions and firms' investments in knowledge-augmenting capabilities abroad

Figure 2 presents our holistic framework to explain patterns of investment both in and out of countries to gain access to knowledge-augmenting capabilities. It shows how host-country states influence the ability of foreign firms to acquire key resources, which those governments are likely to have helped to create, as well as the moderating role of institutions on firms' abilities to invest in knowledge-augmenting assets overseas and to manage different types of knowledge-enhancing subsidiary. In the following sections, we draw on the comparative capitalisms literature to examine how institutions influence firms' abilities to invest in knowledge-augmenting assets overseas.

Figure 2. Institutions and patterns of investment in different types of knowledge-augmenting subsidiary



The state and foreign companies' access to host-country knowledge-augmenting assets

This section focuses on the host-country state as state support to encourage the growth of particular sectors or companies is often important, varies between countries (Hong, Wang, & Kafouros, 2015) and influences their willingness to accept the presence of foreign companies that seek to gain from those investments (U.S. Department of State, 2015).

Numerous typologies exist to capture the state's variable involvement in economic activity, including 'predatory' states (Carney & Witt, 2014), 'state' and 'managed' capitalisms (Schmidt, 2002), and 'segmented business systems' (Wood & Frynas, 2006). Drawing on Whitley's (2005b) typology, we distinguish between 'arm's length', 'dominant-developmental', 'business-corporatist' and 'inclusive-corporatist' states to highlight fundamental differences between government involvement in economic development and their implications for authority sharing and employee commitment. However, any particular state's role in the economy is not uniform; it is often sector specific, resulting in 1) some arm's length states that seek to promote and protect industries that are 'strategically important' (Wade, 2012) or have national-security implications and 2) some developmental states that encourage foreign firms' investments to stimulate domestic development in some industries (Thurbon & Weiss, 2006).

Arm's length states, as an ideal type, set regulations that create a 'level playing field' for all companies and they do not intervene directly in firm activities. Dominant-developmental states, by contrast, adopt a proactive, strategic approach and seek to promote particular firms or sectors by providing financial aid, creating incentives for firms to invest in favoured technologies or markets and using public money to enhance firms' competitiveness (Allen & Allen, 2015; Whitley, 2005b). 'Business' and 'inclusive corporatist' states play a considerable role in economic development, but, unlike arm's length and dominant-developmental states, tolerate the existence of independent intermediary organizations to

represent different groups' interests in policy decisions and implementation (Whitley, 2005b). Whilst business corporatist states work with associations that represent large companies, inclusive-corporatist ones rely on business and union associations to achieve policy objectives (Allen & Allen, 2015; Whitley, 2005b).

Developmental states are likely to tolerate foreign companies tapping into publicly funded schemes to generate knowledge in key sectors only if domestic firms can learn from foreign-owned subsidiaries as part of a local network (Morgan, 2016; Thurbon & Weiss, 2016; U.S. Department of State, 2015), as China (Child & Marinova, 2014; U.S. Department of State, 2015), South Korea and Taiwan (Carney & Witt, 2014) demonstrate. Developmental states differ in their treatment of varying types of foreign investment between themselves and over time. Taiwan has, for instance, sometimes had more restrictive policies on greenfield investment and joint ventures than South Korea, which softened its stance on foreign investment in 1998 to stabilize the chaebols and then limited inward FDI once they had recovered (Thurbon & Weiss, 2006).

Even when arm's length states seek to promote particular sectors, they are likely to accept investment into more types of knowledge-augmenting subsidiaries than their developmental and corporatist counterparts. For instance, the US government has provided financial and technical assistance to firms, including foreign ones (Lange, 2009), in the biotechnology, defence and information technology sectors (Keller & Block, 2013, 2015). However, the U.S. government has blocked some foreign companies' proposed investments. It typically does so if the overseas firm comes from a dominant-developmental state (Sauvant, 2009); is state owned or has close links to its home government, as many Chinese multinationals do (Wu, Hoon, & Yuzhu, 2011); and/or is in a security-related sector, such as ICT (Sauvant, 2009). The U.S. example also illustrates the interplay between inward

investment and home-country institutions: the impact of regulations varies depending on the potential investor's home country.

We expect the willingness of business-corporatist and inclusive-corporatist states to accept foreign companies' investments in knowledge-augmenting resources to be between arm's length states and dominant-developmental states. For instance, the German government did not prevent foreign firms acquiring some German solar photovoltaic (PV) companies, despite state funding to support cutting-edge solar PV technologies and some firms (Allen & Allen, 2015); however, it has blocked the sale of other companies on security grounds (DW, 2016).

Home-country institutions and the relationship between internal and external embeddedness

Institutions do not exist 'outside' actors; they also 'reach down into' actors to shape their interests and preferences (Morgan & Kristensen, 2006). Specifically, home-country institutions that relate to the ownership and control of companies will influence the types of firms that exist, their priorities, the interconnections between them and, consequently, the types of routines, organizational capabilities and strategies that they are likely to implement and pursue successfully (Feinberg & Gupta, 2009; Hong et al., 2015; Khanna, Palepu, & Sinha, 2005).

Institutions do not, though, determine firms' strategies (Allen, Liu, Allen, & Saqib, n.d.; Lange, 2009); actors are able to learn and experiment within existing institutional frameworks (Kristensen & Morgan, 2012; Morgan, 2016), leading to a bounded range of outcomes within any particular institutional context (Lange, Geppert, Saka-Helmhout, & Becker-Ritterspach, 2015; Wood, Croucher, Brewster, Collings, & Brookes, 2009). For instance, Denmark's 'flexicurity' system has constrained and enabled actors' responses to

economic challenges (Kristensen & Morgan, 2012). Unions and workers have been able to use local institutional resources creatively and experimentally to increase the prevalence and quality of firm-level training. Whilst national-level institutions constrained these changes, they transformed some workers' skills, enhancing the availability of particular types of knowledge (Kristensen & Morgan, 2012). Moreover, any particular firm's institutional specificities are likely to be dynamic and differ from national ideal typical ones as a result of cultural, occupational, sub-national and sectoral variations (Allen, 2013; Kristensen & Morgan, 2012).

Any particular firm's dynamic, contested and spatially specific home-country institutional setting will, therefore, shape, but not determine, that firm's ability to share authority with host-country organizations and employees in knowledge-augmenting subsidiaries and to use certain HR policies, such as organizational careers and financial incentives (Brewster et al., 2015; Su, Peng, & Xie, 2016). Consequently, companies' abilities to establish and manage different types of knowledge-augmenting subsidiary will vary (Whitley, 2005a). Institutions are not the sole influence on firms: the nature of the knowledge that the multinational seeks to generate will influence subsidiary embeddedness and, hence, the MNCs' abilities to develop such subsidiaries, too (Asheim & Coenen, 2005; Sölvell & Zander, 1998).

Building on Whitley (2001, 2005b, 2012), we anticipate that, in general, companies from arm's length institutional settings, such as the UK and US, are more likely to invest in knowledge-augmenting subsidiaries overseas than are those from business corporatist regimes, such as Japan, or inclusive corporatist states, such as Germany. As firms in arm's length institutional regimes largely develop competitive competencies in isolation from other organizations and do not rely on the majority of their employees to contribute to the development of their capabilities (Allen, 2013; Brewster et al., 2015), they must manage risks

by themselves, increasing the likelihood that they will invest in new opportunities overseas (Whitley, 2005a). Moreover, their relative isolation means that they are comparatively free from employee and business partner constraints, enhancing their ability to invest abroad (Whitley, 2005a, 2012).

In business-corporatist regimes, the government's influence over the strategies of large domestic firms and the role of business associations in reducing opportunism will enable those firms to share some authority with skilled domestic employees and offer them organizational careers; in addition, state support and influential business associations can facilitate links between large firms (Whitley, 2007). Consequently, the contributions of home-country employees and other organizations to the competitive strengths of firms from business-corporatist environments will constrain their abilities to invest in knowledge-augmenting capabilities overseas (Whitley, 2005a, 2012).

Inclusive-corporatist environments provide support to firms to share authority with, and offer organizational careers to, a considerable number of home-country employees (Brewster et al., 2015; Harcourt & Wood, 2007); moreover, they enable greater inter-organizational risk and information sharing (Whitley, 2005b, 2012). Therefore, such firms' organizational capabilities are likely to be embedded in particular relationships with domestic business partners and a broad range of home-country employees, restricting firms' abilities to establish relationships with new employees and business partners in foreign knowledge-augmenting subsidiaries, as any new ties may jeopardize existing home-country ones (Lane, 1998; Whitley, 2001, p. 47, 2005a, p. 249). For instance, employee representatives in inclusive-corporatist systems are often powerful and may (seek to) block investments in knowledge-augmenting subsidiaries abroad that are relatively independent from the MNC's headquarters (Fritsch, 2015; Whitley, 2012, pp. 222–223).

Firms from dominant-developmental environments are likely to mimic the state's centralization of authority, restricting the delegation of decision-making powers to lower-level employees and providing organizational careers to a small number of senior home-country managers. Dominant-developmental states are likely to favour large firms over small ones, and competition for state privileges will limit co-operation between large companies, unless the state advocates specific inter-firm alliances (Whitley, 2005b). Therefore, companies from dominant-developmental states are likely to develop their competitive strengths in isolation from one another and most employees (Wang, Bruning, & Peng, 2007; Whitley, 2005b).

Consequently, such companies are largely free from business-partner and employee constraints, increasing their ability to invest in knowledge-augmenting capabilities overseas; however, the home-country state is likely to directly and indirectly influence firm investment decisions, leading to patterns of investment that reflect political as well as commercial objectives, as China illustrates (Hong et al., 2015).

Although firms from arm's-length institutional systems are likely to invest more in knowledge-augmenting subsidiaries abroad than companies from other institutional settings, the latter firms will still invest significant amounts (Lehrer, Asakawa, & Behnam, 2011; Sauvant, 2009). Indeed, firms from all institutional systems may engage in 'institutional arbitrage' (Hall & Soskice, 2001): arm's length systems tend to support radical innovations (Hotho, 2014), encouraging some firms from corporatist institutional systems to locate knowledge-generating activities related to radical innovation there (Morgan et al., 2003; Whitley, 2005a); conversely, firms from arm's length systems may locate knowledge-generating activities related to incremental innovation in inclusive-corporatist institutional systems (Matten & Geppert, 2004).

Similarly, firms may invest abroad to 'escape' home-country institutional constraints (Fuller, 2016; Witt & Lewin, 2007). For knowledge-augmenting subsidiaries, these 'escape responses' are likely to occur when the home-country regulatory environment restricts particular knowledge-generating activities and be more relevant for corporatist systems than arm's length ones (Witt & Lewin, 2007). For instance, several German pharmaceutical firms invested in the U.S. in the 1980s to 'escape' Germany's restrictive institutional environment for biotechnology research (Lehrer et al., 2011).

Home- and host-country institutions and different types of knowledge-augmenting subsidiary

We anticipate some variation in the types of knowledge-augmenting subsidiary that firms from different institutional regimes invest in. For instance, 'parent company outposts' are likely to be the most unproblematic type of subsidiary for firms from all types of institutional regime because of their low external embeddedness. By contrast, 'networked' subsidiaries are likely to pose greater problems to MNCs from corporatist regimes compared to arm's length ones, because of their high external embeddedness (Fritsch, 2015; Manning et al., 2012). For example, some Japanese and U.S. pharmaceutical and ICT companies invested in the U.K. to extend their knowledge; to function effectively, these facilities needed to run as networked subsidiaries with key subsidiary employees in these subsidiaries having some decision-making powers and the possibility of an organizational career (Lam, 2003). However, home-country institutions, such as strong internal labour markets, restricted the Japanese firms' ability to meet these requirements, limiting the success of the Japanese firms' investment compared to that of their U.S. counterparts. The Japanese state influenced these institutions: low public funding of basic research and limited incentives for academia to collaborate with industry reinforced the importance of internal labour markets and 'the insular nature of the

human resource system in R&D [in Japan]' (Lam, 2003: 681). Global vanguard subsidiaries and free spirits are likely to pose even more challenges to firms from corporatist systems as home-country actors may prevent the subsidiary from having the substantive autonomy that it requires to function effectively (Fritsch, 2015, p. 151; Manning et al., 2012).

We expect firms from arm's-length institutional systems to be less focused on a particular type of knowledge-augmenting subsidiary, due to employee representatives' limited power and stronger market for corporate control (Lam, 2003; Whitley, 2012). Similarly, business partners and employees are unlikely to constrain the abilities of firms from dominant-developmental states to invest in different types of knowledge-augmenting capabilities abroad; states, both at home and abroad, are, however, likely to be important influences on their investments.

Conclusion

Complementing and extending existing typologies of foreign R&D subsidiaries, we have developed a novel typology of increasingly important knowledge-generating subsidiaries and have identified new groups of subsidiaries. The 'free spirit' and 'parent company outposts' categories of subsidiary highlight a broader range of subsidiary types than existing taxonomies recognize.

This typology has important policy implications. For example, parent-company outposts draw on host-country policies and subsidies, but they have few, if any, substantive links to local organizations, limiting domestic firms' and workers' opportunities to learn from foreign companies and reducing host-economy benefits (cf. Kuemmerle, 1999b). This problem is likely to be greater in arm's length states than dominant-developmental ones, as the former will not scrutinize inward investment as much as the latter and the former are likely to have fewer restrictions on foreign companies establishing separate legal entities in

their jurisdictions. To increase parent-company outposts' embeddedness, host-country governments could increase the conditionality associated with foreign MNCs' use of infrastructure or eligibility for subsidies. Furthermore, governments could implement sector- and region-specific policies to co-ordinate and increase the benefits of public-sector and foreign and domestic firms' investments (Phelps, 2009).

Free spirits pose different challenges: host-country governments should devise ways to encourage their growth and seek to embed them in the local knowledge-generating system. For instance, government programmes in arm's length settings to support small businesses, which free spirits are likely to be, can help 1) scientists, technologists, and engineers start their own companies, 2) private-sector organizations identify suitable investments and 3) small firms gain access to public-procurement schemes; all of which aid network formation (Keller & Block, 2013). For networked and global vanguard subsidiaries, the host-country government should seek to ensure their continued success and develop an understanding of the factors that promoted that success. These factors could include research institutes, firms, financial systems and local labour-market institutions.

We have assessed how institutions shape firm characteristics, behaviour and their ability to develop knowledge in different locations. Whilst we expect firms from similar institutional settings to share some characteristics, any individual company is unique and, hence, within any specific institutional system, firms are diverse (Hotho & Saka-Helmhout, n.d.; Lane & Wood, 2009). Therefore, firms' mechanisms and capabilities to identify, generate and absorb advanced knowledge will vary; furthermore, the range of innovation possibilities that any particular firm's researchers, technologists and managers foresee will differ and be company specific (Metcalfe, 1995). Consequently, institutions do not determine the diversity and prevalence of MNCs' knowledge-augmenting subsidiaries, but do delimit possible outcomes (Kristensen & Morgan, 2012). Employee representatives' powerful role in

corporatist systems, for instance, makes the establishment of global vanguard subsidiaries less likely.

Firm specificities also include their finite resources and existing social ties. Three important points follow from this. First, as external and internal embeddedness require firms to identify, develop and manage potentially useful inter- and intra-organizational relationships, companies' limited resources mean they have to decide which other organizations and/or parts of the MNC (not) to connect to. Second, managers' social and financial investments in existing linkages may make them reluctant to severe those ties, potentially resulting in the continuation of some relationships that do not augment the firm's knowledge. Third, managers' incomplete information about the benefits of establishing new subsidiaries as well as existing subsidiaries' activities will influence investment decisions. Together, these points indicate that existing and new relationships within and between firms are not necessarily 'optimal'; they do not inevitably maximize firms' knowledge-generating capabilities, but will shape the diversity and prevalence of MNCs' knowledge-augmenting subsidiaries.

Furthermore, by highlighting the diversity of firms that seek to invest in knowledge-augmenting capabilities abroad, we draw attention to the interplay between inward investment and institutions. In particular, the rise of Chinese MNCs has led to greater scrutiny of foreign investors who wish to acquire U.S. companies (Sauvant, 2009; Wu et al., 2011). Whilst the U.S. illustrates how this interaction may reduce the availability of knowledge-augmenting resources to some foreign investors, other examples demonstrate how the interaction between foreign investors and the institutions around knowledge-augmenting resources can increase the availability of those resources over time (Asakawa & Som, 2008).

Our focus helps to explain how institutions shape patterns of inward and outward investment in knowledge-augmenting facilities, highlighting the host-country state's role in

allowing foreign firms to invest there to benefit from knowledge-generating resources. In general, developmental states are likely to be more reluctant to countenance such investments than regulatory states are. We also showed how home-country institutions are likely to shape, *inter alia*, MNCs' authority sharing with host-country employees. We, therefore, extend existing typologies that tend to assume that 1) multinationals can acquire or establish foreign firms with those capabilities easily and 2) all firms are equally able to share authority with host-country employees and business partners, and gain the commitment of key foreign-workers to knowledge-augmenting activities. We, therefore, supplement existing classifications to offer a theory that seeks to explain the prevalence of different types of knowledge-augmenting subsidiary abroad as well as the kinds of firm that are likely to invest in them, aiding our understanding of a group of subsidiaries that is becoming increasingly important and politically salient and highlighting future research areas.

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