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Home-Owned versus Foreign-Owned Firms in the UK Automotive Industry: Exploring the Microfoundations of Ambidextrous Production and Supply Chain Positioning

Abstract

The open nature of competition in the UK automotive industry is demonstrated by the large number of foreign firms that operate in the sector, which necessitates both exploitative and explorative capabilities. Contingency theory suggests that firms align their internal structure with contextual factors. As such, the main aims of this study were to investigate whether it was possible to distinguish domestically-owned (UK) and foreign-owned firms based upon: a) the microfoundations of ambidextrous production, which are conceptualised as lean and agile routines; and b) the tier at which these firms operate in the automotive supply chain. Survey data were collected from 85 home-owned and 55 foreign-owned firms, whose operations are located in the UK Midlands automotive industry. Logistic regression results reveal that domestically-owned firms were significantly more likely to be implementing agile (explorative) production methods, whereas foreign-owned firms were significantly more likely to be implementing lean (exploitative) production. Moreover, home-owned and foreign-owned firms were found to be significantly more likely to be operating upstream and downstream in the automotive supply chain respectively. Thus, the findings support a contingency theory explanation, suggesting that firms align their performance priorities with contextual factors, but we argue that home-owned and foreign-owned firms have evolved to compete using different kinds of innovative capabilities within the same industry. These capabilities, however, are located at different tiers in the automotive supply chain. On this basis, although neither home-owned nor foreign-owned firms were found to be endogenously ambidextrous, we argue that foreign-owned firms internationalise into the UK automotive sector to exploit the explorative capabilities acquired by home-owned firms operating upstream in automotive supply chains, thus enabling ambidextrous capabilities at an exogenous, industrial level.

Key words: Automotive; Ambidexterity; Lean; Agile; Supply Chain; Routines; Contingency Theory.

1.0 Introduction

Over the past decade, the concept of organisational ambidexterity has become increasingly important within the International Business (IB) field, with extant literature covering a range of diverse contexts (e.g. Luo and Rui, 2009; Vahlne and Jonsson, 2017). Organisational ambidexterity refers figuratively to a firm's aptitude for balancing the ostensibly competing demands of exploiting existing competences and exploring the possible development of new competences (Wang and Rafiq, 2014). Organisations engaged primarily in exploitation continue along an existing technological trajectory; in contrast, exploration involves an organisation departing from an existing knowledge base and skills (Lavie *et al.*, 2010). Concurrently, debates concerning the relative merits of exploitation versus exploration have been taking place within the fields of Operations Management (OM) and Supply Chain Management (SCM), where ambidexterity is conceived as an efficiency versus adaptability issue, traditionally ascribed with the lean-agile debate. As such, the concept of ambidexterity explains how organisations and decision-makers manage the trade-offs between different resource investments and performance outcomes. A traditional perspective advocates that the ability of a Multinational Enterprise (MNE) to transfer and exploit technological and knowledge-based assets is fundamental to its capacity to create value in foreign markets (Hymer, 1960; Kogut and Zander, 1993; Mudambi, 2002). However, if, like domestic organisations, MNEs have to balance exploitation and exploration as the ambidextrous research agenda suggests, intriguing questions are raised, as to how multinational subsidiaries balance their competences, and as to where they position themselves in complex supply chains.

As contingency theory (CT) asserts that businesses align their routines, practices and performance indicators with contextual factors, it is important to explore the operational differences between home-owned or foreign-owned firms. The IB literature has extensively investigated numerous aspects of the relationship between company internationalisation and innovation (e.g. Berry, 2014; Cantwell, 1989; Kafourous *et al.*, 2008; Mudambi *et al.*, 2018; Phene and Almeida, 2008), yet limited research has been published concerning the influence of contextual factors (Agarwal *et al.*, 2014). This is exemplified in relation to the differences in production practices between home-owned and foreign-owned organisations (Boer *et al.*, 2013), thus, contextual factors in internationalisation are important to consider given their mediating role (Vrontis and Christofi, 2019) as they can 'pull' or 'push' (internationalising) firms to pursue different strategic behaviours (Vrontis *et al.*, 2009) organisations. Moreover, this research is driven by a lack of research investigating different microfoundations of ambidexterity within a single eco-system. Owing to this lacuna, we specifically sought to examine whether home-owned and foreign-owned firms implement different microfoundations (i.e. exploitative or explorative) of ambidexterity within the context of one regional industry.

We conceptualise exploitative and explorative microfoundations as the tools, practices, routines and concepts (TPRCs) of lean and agile production respectively (see section 2.1). Cumulatively, these individual TPRCs constitute organisational routines. The UK automotive sector has been successful in attracting foreign direct investment since the 1980s, meaning that both home-owned and foreign-owned firms have operated and evolved alongside each other over the subsequent decades. As such, this sector provides a mature industrial context in which to better understand the dynamics of competition. Significantly, the automotive sector has also recently been the setting for both important IB (Saranga *et al.*, 2018; Seyoum and Lian, 2018; Khan *et al.*, 2019) and ambidexterity research (Zimmermann *et al.*, 2015). While IB research has been inclined to focus on emerging and developing economies and ambidexterity research has concentrated on specific issues (e.g. the initiation of an ambidextrous orientation) there is a need to understand better the microfoundations of ambidexterity within established firms operating in economically developed economies, such as the UK. Furthermore, much of the extant research on microfoundations, as well as on lean and agile production, has concentrated principally on single organisations with less attention being paid to cross-organisational phenomena (Liu *et al.*, 2017). Within the automotive context, Qamar and Hall (2018) and Qamar *et al.* (2018) have recently discovered a relationship between lean and agile production and supply chain position; however, neither study investigated if and how ownership (i.e. domestic or foreign ownership) was related to their findings. Nevertheless, IB scholars have highlighted the importance of domestic or foreign ownership, specifically in relation to innovation and knowledge (Un, 2016). We build upon this work, by adopting a CT approach to test whether home-owned and foreign-owned firms have a relationship with supply chain positional tier. Therefore, this paper adopts a wider focus by considering not only a selection of firms, but a supply chain setting; thus, it provides a deeper explanation of the phenomenon under investigation (Foss, 2011). To achieve this, the following research questions are posed:

RQ1 *Can home-owned (UK) and foreign owned firms be distinguished by explorative (agile) and exploitative (lean) practices?*

RQ2 *Can home-ownership (UK) and foreign-ownership be used to distinguish the tier at which firms operate within the automotive supply chain?*

This article is structured as follows. Next, we present the conceptual framework underpinning this research. Following this, we outline our four hypotheses after reviewing the literature concerning ambidexterity, home-owned and foreign-owned firms, and supply chain positioning. Next, the automotive context and the research design are presented. We then present our analytical findings in relation to the hypotheses tested, before discussing the implications of our results. Finally, we conclude the article by outlining our contributions and suggesting avenues for future research.

2.0 Theoretical Foundation

2.1 Conceptualising the Microfoundations of Ambidextrous Production

Within an organisational setting, the concept of ambidexterity is concerned with the choice that a firm makes between either discovering new possible ways of doing things (exploration) or relying on improving existing ways of doing things (exploitation) (March, 1991). Despite exploration and exploitation being contrasting strategies, organisations increasingly need to find a balance between the two to compete successfully (Tushman and O'Reilly, 1996). To achieve ambidexterity – that is to engage simultaneously in both exploration and exploitation – it is necessary for organisations to resolve internal conflicts and competing demands within a changing, competitive environment (Auh and Menguc, 2005; Raisch and Birkinshaw, 2008). The concept of exploitation can be readily associated with factors such as efficiency, productivity, control and reduction in variance (Vahlne and Jonnson, 2017), that are in concordance with lean production methods. On the contrary, exploration emphasises discovery, variations and adaptability (O'Reilly and Tushman, 2008) and is therefore more consistent with agile production methods. This configuration of lean/exploitation and agile/exploration is consistent with the approach of March (1991) alongside researchers in SCM (Kristal *et al.*, 2010). Nevertheless, lean and agile production methods can be associated with a particular shared set of microfoundations from which lean and agile production methods derive both their differentiation relative to other firms as well as their competitive positions and value propositions in the market.

The resource-based view is conditional on the possession of capabilities to explain heterogeneous firm performance in the market (Helfat and Peteraf, 2003). Capabilities are a relatively large scale unit of analysis with an identifiable purpose, shaped by conscious decisions and constituted of resources, practices and routines, (Dosi *et al.*, 2001; Teece *et al.*, 1997); the former being firm assets that can be deployed in the process of rent generation, and the latter being the organisational processes that enable that deployment. Organisational routines are well defined as “repetitive, recognisable patterns of interdependent actions carried out by multiple actors,” (Feldman and Pentland: 2003, 95). From a strategic perspective, organisational routines are broadly conceived as the stable and repeated processes that firms perform (Teece, 2012) which are linked to the context in which they are enacted (Feldman *et al.*, 2016) while at a more conceptual level routines are thought of as an organisation's genes (Nelson and Winter, 1982). Meanwhile, capabilities have been conceptualised as higher-level routines (Zollo and Winter, 2002), that develop through practice (Helfat, and Peteraf, 2015) which configure and operationalise the sub-routines and resources a firm possesses. In a competitive environment, where ambiguity exists and uncertainty is high, firms have to learn and utilise knowledge in order to survive (March, 1991). As a result of this imperative, as Dosi and Nelson (2010) argue, idiosyncratic capabilities and dynamically idiosyncratic forms of learning by specific firms are the general rule. Our theoretical framework conceives organisational routines as being comprised of

TPRCs, which are the “microfoundations of capabilities” (Teece, 2012: 1397); these TPRCs are presented below in Table 1. Firms develop, enact and prioritise different organisational routines (TPRCs) to achieve different operations-based competitive advantages (Peng *et al.*, 2008: 733).

Firms possess heterogeneous organisational routines for the advancement of different strategic objectives, but also for the continuation of being. We focus on the former type of routine, given our concern with the pursuit of manufacturing paradigms, and either exploitation or exploration competences. Some of these routines are related to the continuation of existing processes or the creation of existing products, while others are concerned with the development of new products or processes (Zollo and Winter, 2002); however, both types of routine are centred on manufacturing innovation (Moore and Tushman, 1982). The incremental innovations associated with the refinement of existing processes and products command different capabilities to those that enable the more radical innovations of developing new products or processes. To this end, previous literature (Cole, 2001) has referred to the former as improvement, and the latter, which involves radical change, as innovation. Other researchers (Vaillant & Lafuente, 2019) propose that process agility is aligned with an exploitative (in turn, lean) orientation as it is adopted by organisations to “retool” (p.245) effective routines. While we recognise the logic of their conceptualisation, as even incremental routine changes require some process adaptations, we advocate this is actually process refinement. In turn, more radical process changes are what we refer to in our conceptualisation of process agility. Our conceptualisation of lean - incremental improvement of existing processes - as exploitative, and agile - generation of new products (via radical process innovation) - as explorative is consistent with Tsinoopoulos and Al-Zu’bi’s (2014) assertions.

Improvement and innovation capabilities are enacted through the bundling of different routines (Adler *et al.*, 1999) which result in dominant manufacturing paradigms, namely either lean or agile. These strategies, although sharing some routines (in contrast to the received wisdom of ambidexterity as paradox (Smith & Tushman, 2005)), are ascribed with competing performance indicators and result in different sources of competitive advantage. Therefore, the capabilities required to pursue the exploitative continual improvement associated with lean and the exploratory radical innovations of agile are contradictory. As such, we seek to explore the dynamics of ambidexterity within the automotive supply chain by exploring the performance of the routines that have been advocated as the microfoundations of lean or agile production in extant literature (Table 1).

Table 1: The Microfoundations of Lean, Agile and Ambidextrous Production - Tools, Practices, Routines & Concepts (TPRCs)

Concept	TPRCs
Lean	<ul style="list-style-type: none"> a) Elimination of waste b) Continuous improvements c) Zero defects d) Production smoothing e) Line balancing f) Value stream mapping g) Total productive maintenance h) 5s
Hybrid (Lean & Agile)	<ul style="list-style-type: none"> i) Just-in-time j) Kanban k) Multi-functional machines l) Multi-functional teams m) Total quality management n) Employee empowerment o) Single minute exchange dies
Agile	<ul style="list-style-type: none"> p) Virtual enterprise q) Concurrent engineering r) IT-driven enterprise s) Rapid prototyping t) Reconfiguration u) Core competence management v) Knowledge-driven enterprise

Source: Qamar and Hall (2018: 241-242)

In sum, TPRCs are the identifiable components of a firm’s organisational routines, which are bundled together and coordinated to generate capabilities. Although similarities exist (i.e. ambidextrous practices are present in both lean and agile methods as demonstrated in the hybrid category), we contend that as each production strategy specifies different resources, these resources ultimately encompass capabilities designed for different performance dimensions.

2.2 Contingency Theory

CT is an important theoretical lens through which to view organisations (Sousa and Voss, 2008). The over-arching consensus regarding CT is that firms should not be viewed in silo, as performance may actually be dependent on the degree to which a firm’s competences, i.e. routines, are appropriately aligned with the demands of its environment (Lawrence and Lorsch, 1967; Thompson, 1967). Given this, firms are likely to make internal changes to maintain their alignment, or ‘fit’, with environmental demands (Donaldson, 2001). The premise behind CT is that no theory or method is applicable in every circumstance (Lawrence and Lorsch, 1967), and so there is no single best way to design an organisation, rather organisations’ priorities are contingent on their context. Failure to appreciate this can often explain differences between management and performance outcomes.

With this in mind, Sousa and Voss (2008) suggest that researchers should not solely focus on analysing the endogenous management practices of firms, but they should seek to investigate the context in which those firms are situated. The importance of considering the 'bigger picture' is also reflected in recent IB and SCM publications (Choi and Yeniyurt, 2015; Marodin *et al.*, 2016; Gnizy *et al.*, 2017; Lindner *et al.*, 2018; Qamar and Hall, 2018; Qamar *et al.*, 2018). However, Agarwal *et al.* (2014) noted that few studies have incorporated a wide range of practices when seeking to assess the innovativeness, and in turn, the competitiveness of an industry, and there is also a need to explore the impact of contextual factors on innovation (Collinson and Liu, 2019). Thus, we use a contingency lens to investigate whether there is a relationship between the home-ownership or foreign-ownership of firms in relation to the microfoundations (TPRCs) ascribed with ambidextrous production that firms operationalise. Moreover, considering the call for contingency perspectives to be applied in SCM (Chavez *et al.*, 2012), and Qamar and Hall's (2018) recent finding linking production strategies with supply chain positional tier, we sought to examine whether home-owned and foreign-owned firms are likely to occupy different supply chain tiers within an industry context. In summary, we anchor our research on CT to explore if country of ownership (home-owned or foreign-owned) can be used to: a) distinguish between lean (exploitative) and agile (explorative) microfoundations; and b) determine where firms are positioned in the automotive supply chain.

3.0 Literature Review and Development of Hypotheses

Originating from the Japanese automotive industry, more specifically the Toyota Production System (TPS), lean production is intimately connected with the automotive context. Lean production has received a consensus definition as a production strategy that ensures the elimination of waste whilst emphasising the flow of goods. However, contemporary market environments are presenting organisations with an important challenge (Jasti and Kodali, 2015); consumers are now demanding more innovative products, but they require or expect this innovation to occur in a very short period of time (Thrassou *et al.*, 2018). This trend can be observed in the automotive industry, given the sharp increase in UK vehicle production from 2010-2016 (SMMT, 2016), the ability to adapt quickly and effectively to changes in consumer expectations is just as important as efficiency metrics (Chi and Gursoy, 2009). With this in mind, it is important to conceptualize exploitation as not only a production concept but a more holistic strategy, an argument that is also applicable to agile, explorative production.

The birth and development of agile production occurred as increased levels of global competition diminished domestic barriers against foreign competition (Rattner and Reid, 1994). American manufacturers experienced a decline in sales as they were unresponsive to the marketplace, while smaller, more flexible and responsive manufacturers took control of global markets. The concept

of ‘agility’ originates from the 1991 Agility Forum, the objective of which was to develop a manufacturing revitalisation strategy to counteract the decline of American manufacturing. The literature surrounding agile production has continually prioritised adaptability, i.e. a move away from relying on existing knowledge and products, which parallels exploration within the ambidexterity context.

3.1 Ambidexterity - Home-Owned versus Foreign-Owned

The innovative activities of international corporations have long been examined in IB research.¹ In a seminal study, Caves (1971) adopted an industrial organisation perspective to argue that the horizontal investments made by firms in foreign markets were a consequence of that firm’s ownership of a unique asset (a differentiated product; a patented invention) which could be transferred and exploited across borders at no extra cost. The connection between the internationalisation of operations and the growth of the firm was subsequently stated more formally in the development of internalisation theory, which showed how the international transfer of technology (particularly a firm’s R&D) could be achieved more efficiently (and profitably) within the firm, rather than externally via the market (Buckley and Casson, 1976; Rugman, 1981). Internalisation theory proposes that a company should operate wholly owned subsidiaries in foreign countries only so long as that firm possesses intangible assets and capabilities that allow it to compete, and that these assets cannot be transferred through any other means, such as licensing (Hennart, 1982; Mudambi and Navarra, 2004). These primary theoretical propositions initially explained data, and a reality, in which the core competences and the key decisions of the MNE were located and undertaken in the headquarters of the organisation’s home country (Hitt *et al.*, 2016).

Equally important for our research is the enduring and repeated emphasis in the literature on internationalisation as a driver of innovation at both the subsidiary and the corporate level (Kafourous *et al.*, 2008; Chen *et al.*, 2012; Cao *et al.*, 2018). Nevertheless, this insight is balanced by an awareness that the international transfer of technology brings with it the risk of knowledge diffusion that may stimulate competition (Young and Lan, 1997; Alcácer, 2006; Alcácer and Chung, 2007). These risks are illustrated most vividly by Pavitt and Patel (1999) who found that the skills and knowledge from which firms derive competitive advantage are less internationalised than all other dimensions of corporate activity (Carlsson, 2006). However, McCann and Mudambi (2005) state that the interface between research on the organisation of firms across borders and the insights generated from the economic geography literature on the location of economic activity is surprisingly lacking attention. Moreover, the perspectives of economic geography and IB continue to be quite different (Bathelt *et al.*,

¹ Dunning (1958), in essence, provided an empirical enquiry into the influence the technology of US MNEs had on the technology and productivity of UK manufacturers.

2018). In particular, few attempts have been made to relate a company's innovativeness to its regional context (Beugelsdijk, 2007), with more attention given to MNEs' international technological accumulation and generation of knowledge across borders instead (Cantwell, 2017).

Over the previous few decades the way in which Multinational Enterprises (MNEs) have organised their activities – including R&D – and where they have located their operations has evolved as a result of (among other factors) ever more powerful and sophisticated technology (Narula, 2014); and the increasingly intricate division of labour (Strange and Humphrey, 2018). A related shift in the way in which MNEs organise their value adding activities has been caused by rapid increases in the complexity of products and services. It has been argued that no firm, whatever its size, is able to collect and retain the diversity of knowledge assets to sustain technological supremacy (Contractor *et al.*, 2010; Asakawa *et al.*, 2018). Instead, firms are increasingly dividing their value chain over national borders, segregating those activities that are predominantly “specialized” and non-repetitive from those which are “standardized” and repetitive (Mudambi, 2008; Andersson *et al.*, 2016). A firm that is able to locate different value-adding activities (including innovation) in different national contexts to minimise costs and maximise output is well placed to compete in a given industry (Tallman and Yip, 2009).

As well as spatial separation, previous research has also highlighted the importance of temporal separation, which occurs when firms shift between phases of exploitative activity (i.e. concentration on the improvement of current products or processes) and phases of explorative activity (i.e. the development of new products or processes) (Brown and Eisenhardt, 1997). This suggests that firms oscillate between exploitative and explorative orientations and thus possess the capability to act ambidextrously. In addition, Moncada-Paternò-Castello *et al.* (2011) assert that MNEs are increasingly organising explorative and exploitative activities in multiple geographical regions, which indicates that firms are ambidextrous, but organise their activities across space based upon contextual factors to add value to the headquarters.

Although there is consensus in the literature that firms require both lean (exploitative) and agile (explorative) capabilities (Geerts *et al.*, 2018) to remain competitive, the empirical evidence establishing whether ambidextrous processes are equally balanced within organisations (Gupta *et al.*, 2006) is limited. As ambidexterity emphasises conflicting objectives, a common approach is to distinguish between exploration and exploitation activities, an approach that has been traditionally deployed in studies investigating lean and agile paradigms (Qamar and Hall, 2018). Given this, we now discuss the studies which have explored lean and agile production relative to ownership (home-owned versus foreign-owned).

With respect to firm ownership, Rahman *et al.* (2010) investigated manufacturing organisations located in Thailand, finding that foreign-owned firms demonstrated higher levels of lean implementation in comparison with home-owned (Thai) firms. This reaffirmed Beaumont *et al.*'s (2002) findings, that foreign-owned firms outperformed their home-owned rivals, as foreign-owned firms were more likely to implement practices and routines associated with waste reduction and lean. These results complement the work of Voss and Blackmon (1996), who found that production sites of foreign parents adopted higher levels of efficiency-driven practices and acquired higher levels of performance when compared to production sites of domestic parents. Furthermore, Agarwal *et al.* (2014) found that foreign-owned multinationals operating in Australia adopted lean initiatives to a greater extent than domestically-owned firms, although others presented inconclusive findings between the implementation of lean production (i.e. exploitative practices) and firm country of origin (Dora *et al.*, 2014), or even no relationship between the pursuit of lean practices and ownership (Sila, 2007). In contrast to the debate concerning lean production, Buckley *et al.* (2010) noted that home-owned organisations, in comparison with foreign-owned firms, may be more agile, thus explorative and responsive to profit opportunities, making them competitive, especially in labour intensive markets. With regard to firms in the UK, although there is a stream of literature (Yusuf and Adeleye, 2002; Zhang, 2011; Thomas *et al.*, 2016; Gunasekaran *et al.*, 2018) associated with flexibility and adaptability (agile microfoundations), these studies have neglected to examine whether firms are foreign-owned or home-owned. Despite the inconclusive findings of previous studies, the literature states that foreign-owned firms are more likely to implement lean microfoundations (Voss and Blackmon, 1996; Beaumont *et al.*, 2002; Rahman *et al.*, 2010; Agarwal *et al.*, 2014), and that agile microfoundations are being applied in the UK (Yusuf and Adeleye, 2002; Zhang, 2011; Thomas *et al.*, 2016; Gunasekaran *et al.*, 2018). Thus, we propose the following hypotheses:

Ha: Home-owned firms in the UK automotive industry are more likely to implement agile (explorative) initiatives when compared with foreign-owned firms.

Hb: Foreign-owned firms in the UK automotive industry are more likely to implement lean (exploitative) initiatives when compared with home-owned firms.

3.2 Supply Chain Position

As the attention of IB researchers moved away from MNE corporate headquarters to focus on the subsidiary level, the idea that subsidiaries were embedded in both internal and external networks was established (Ghoshal and Bartlett, 1990; Birkinshaw: 1997; Achcaoucaou *et al.*, 2014). This research was informed by the understanding that an external network – as well as the internal network - could be a particularly important resource through which a subsidiary (and by extension the parent multinational) could access complementary resources and capabilities to create competences (Bartlett

and Ghoshal, 1989; Andersson *et al.*, 2002). For example, Almeida (1996) established that the U.S. subsidiaries of foreign multinationals sourced technology from local companies in creating knowledge assets. Almeida and Phene (2004) posited that differences in subsidiaries' innovatory abilities could be best understood by examining both the home and host country contexts in which those subsidiaries operate, as well as the relationships between subsidiaries and other firms in both of these contexts. Subsequently, in an empirical study of seven Brazilian subsidiaries operating in the same industry and local context, Figueiredo (2011) examined how subsidiaries drew upon both internal and external sources of knowledge and the effect this had on innovative performance. Similarly, Ciabuschi *et al.* (2014) examined the relationship between corporate and external embeddedness and its effect on innovation-related business performance. Informed by and building on these findings, in our research we focus on the notion that the innovative capabilities of a MNE are not only found within the boundaries of the firm but also depend upon access to complementary knowledge assets and technological skills located in a local host country or national innovation system (Collinson and Wang, 2012). However, the economic geography of the automotive industry is complex, with local, national and regional production networks 'nested' within the global organisational structures and business relationships of large international firms (Sturgeon and Van Biesebroeck, 2011). Through this organisation, independent suppliers, who are organised in differentiated tiers, undertake the majority of component production (Sturgeon *et al.*, 2008; Pavlinek and Zenka, 2016).

Given this, a second important theme of this paper is the alignment (or misalignment) that exists between particular capabilities and the market opportunities that firms may seek to exploit. Thus, investigating the relationship between supply chain position and firm ownership is a further area of interest for our research. The lean literature has been heavily focussed on firms operating downstream in supply chains, such as Original Equipment Manufacturers (OEMs) and first-tier suppliers (Jayaram *et al.*, 2008), but, it is important to question whether lean and exploitative capabilities permeate entire supply chains. Although lean production has been considered the dominant production strategy of the automotive industry, the literature (Doran, 2004; Boonsthonsatit and Jungthawan, 2015; Qamar *et al.*, 2018) has found that firms also require explorative strengths, particularly at different tiers of the automotive supply chain. Furthermore, prior to the Brexit vote, the UK industry was experiencing a trend in reshoring (Qamar, 2016), suggesting that contextual factors within the Midlands are favourable to firms locating their operations in the region. Thus, consistent with CT, which advocates that firms' performance is related to its 'fit' with environmental conditions, it is important to investigate whether the pursuit of exploitative and explorative strategies are related to contextual factors, particularly country of ownership (home-owned vs foreign-owned) and supply chain positioning.

In the UK automotive supply chain, Qamar and Hall (2018) recently found that lean and agile production strategies were more likely to be implemented upstream and downstream respectively.

Given this, it is expected *a priori* that explorative capabilities are located upstream within complex supply chains. Yet, there is limited evidence to suggest that home-owned and foreign-owned firms operating in the same eco-system predominantly operate at different supply chain tiers. The argument of foreign-owned firms operating downstream in complex supply chains is generated via the notion that MNEs are generally larger than domestically-owned organisations, thus possess greater availability of capital and technological resources (Shah and Ward, 2003; Dora *et al.*, 2013) which allows them to position themselves closer to the end consumer. These firms are also more likely to engage in acquisitions (or cooperative strategies) to enter a market due to the large time investment needed to develop downstream capabilities internally (Dierickx and Cool, 1989). Drawing on these arguments, the following hypotheses are proposed:

Hc: Home-owned firms in the UK automotive industry are more likely to be operating upstream in supply chains when compared with foreign-owned firms.

Hd: Foreign-owned firms in the UK automotive industry are more likely to be operating downstream in supply chains when compared with home-owned firms.

4.0 Methodology

In 2014, the UK was ranked as the fourth largest European nation in terms of automobile production with an automotive sector comprised of over 2,000 first-tier suppliers, employing approximately 770,000 people and producing 1.6 million vehicles (SMMT, 2015). With a turnover of £64.1bn and a contribution of £12.4bn in value-added (*ibid.*), the automotive industry is a crucial part of the UK economy. In this study, we focus our attention on the Midlands automotive industry, which is home to manufacturers of component groups including the driveline, chassis and body panel, engine components, interior trim, electrical components and design, which operate as part of a large cluster at different tiers of the supply chain. The region is perhaps best known for its OEMs such as Jaguar Land Rover, Aston Martin and Mini, and first-tier suppliers, but given the open nature of the industry, a large proportion of these firms, including heritage brands, are foreign-owned. In 2014, 1,710 firms were operating within the Midlands automotive industry. Of this population, 450 firms were sampled with survey data obtained from the Operations/Managing Directors of 140 of these firms to provide an overall response rate of 31% (see section 4.1 for non-respondent bias). Forty-two of these completed surveys were returned within the first two months, 64 surveys were returned within the second two-month period, and 34 surveys were received in the final two months of the data collection phase.

4.1 Distinguishing Lean & Agile Firms

The subjective conceptualisations of the lean and agile paradigms within the literature means that there is no universally accepted configuration for these constructs (Panwar *et al.*, 2018); however, to ensure rigour and consistency with recent discussions, we adopted Qamar and Hall's (2018) methodology with regard to ascribing TPRCs with lean and/or agile production strategies. Survey respondents were asked to rank the respective implementation of 22 TPRCs within their organisation using a five-point Likert scale, with '1' representing no implementation and '5' signalling high levels of implementation. Averages were then calculated for the three routine bundles (lean, agile & hybrid) with the highest mean score amongst these categories determining whether each firm was classified as pursuing a lean, agile or hybrid strategy. This approach suggests that all firms were only partially lean or agile, but rather than this serving as a limitation of our study, we assert that it actually provides a more realistic representation of firms. Fully implementing just one production strategy (lean or agile) is perceived as somewhat obsolete (Bamford *et al.*, 2015), as in reality firms operate somewhere on a spectrum between the two paradigms. This is reflected in the leagile, hybrid bundle, but when calculating mean values, no firms scored most highly within this category, indicating that ambidexterity may be difficult to sustain over time, in turn leading firms to favour lean or agile microfoundations. This indicates firms' cognizance of a trade-off (Ebben and Johnson, 2005), which, logically, supports the notion of a performance paradox (Yalcinkaya *et al.*, 2007; Koryak *et al.*, 2018). As such, we refocused our attention on purely lean and agile strategies; and found that 74 firms were implementing lean practices and 66 were implementing agile practices. Our survey instrument supported this decision (which we discuss in more detail in section 4.2), by asking respondents which strategy (lean, agile, leagile) their organisation was inclined to pursue to the greatest extent. Results demonstrated 97% accuracy with the calculated averages. Furthermore, we adopted Armstrong and Overton's (1977) technique to test for non-respondent bias by using late responses as a substitute for non-respondents. The first 30 surveys received were compared with the last 30, with T-tests conducted for five random TPRCs selected from Table 1. Based upon a lack of significant differences, we concluded that there was no non-respondent bias, attesting to the generalisability of our findings (Miller and Smith, 1983).

4.2 Analysis

To determine the number of factors in relation to the TPRCs (Table 1), we utilised principal component factor analysis with results demonstrating that three factors had eigenvalues greater than 1. However, the eigenvalue for the hybrid category only marginally exceeded this value. As 69% of variance was attributable to the two-factor solution, we took the step to discard further examination of the third (hybrid) factor. This is consistent with Kim and Mueller's (1978) assertion that only factors accounting for a variance of more than (and with eigenvalues greater than) one should be used. Cronbach's alpha

was then used to test the internal consistency reliability amongst the TPRCs (Table 2). Lean and agile TPRCs (as ascribed in Table 1) both achieved scores greater than 0.70, determining that the sub-items measured the same constructs (Vogt, 1999) and that they were considered to be both internally consistent and reliable. The hybrid category also received a qualifying Cronbach's alpha score, but was not included in subsequent analysis as no firm scored the highest in this category.

Table 2: The Reliability of the TPRCs Associated with Lean and Agile Production

Manufacturing Strategy	Number of Items	Cronbach's Alpha
Lean	15	0.72
Lean excluding hybrid TPRCs	8	0.82
Hybrid	7	0.73
Agile	13	0.70
Agile excluding hybrid TPRCs	7	0.92

Logistic regressions were performed using SPSS to predict the probability ratio of category membership/placement of a dependent variable in relation to several independent variables (Moayed and Shell, 2009; Qamar and Hall, 2018), whereby probability is estimated using a logistic function. More specifically, multinomial logit models were used to identify what factors affect the probability of implementing exploitative/explorative (lean/agile) microfoundations or supply chain positioning (downstream, midstream, upstream). Initially, this can be expressed in the following two equations:

$$1) \Pr(Y = 0|X) = \frac{e^{x\beta^0}}{e^{x\beta^0} + e^{x\beta^1}}$$

$$2) \Pr(Y = 1|X) = \frac{e^{x\beta^1}}{e^{x\beta^0} + e^{x\beta^1}}$$

Given equation 1 and 2, outcomes 1 and 0 recorded in Y represent the outcomes where a set of coefficients (β^1 and β^0) are estimated, corresponding to each outcome. However, this model is unidentified as it has more than one solution β^1 and β^0 and leads to the same probability if $Y=1$ and $Y=0$. To solve this problem, β^0 has to be set at zero. Therefore, the remaining coefficients β^1 will measure the relative change to the $Y=0$ group. This can be further expressed in equations 3 and 4:

$$3) \Pr(Y = 0|X) = \frac{1}{e^{x\beta^1} + 1}$$

$$4) \Pr(Y = 1|X) = \frac{e^{x\beta^1}}{e^{x\beta^1} + 1}$$

With this in mind, the relative probability of implementing exploitative (lean) initiatives to the basic outcome of implementing explorative (agile) initiatives can be seen in equation 5:

$$5) \frac{\Pr(Y = 1|X)}{\Pr(Y = 0|X)} = e^{x\beta^1}$$

The exponential value β^i is defined as the risk-relative ratio for one-unit change corresponding to variable X^i , which represents the ownership characteristics in this study. In summary, home-owned and foreign-owned firms, coded as 0 or 1 respectively, constituted the independent variables in this analysis. By contrast, the dependant variables were lean (exploitative) or agile (explorative) in Models 1 and 2, and supply chain positional tier (upstream, midstream and downstream – the parameters are presented in Table 5) in Models 3 and 4.

5.0 Results

Table 3 illustrates the number of domestic and foreign-owned firms implementing lean and agile production. Given the research context, it is no surprise that the majority of firms (85) are domestically owned; however, a sizable proportion (approximately 40 percent) of the sample is foreign-owned, demonstrating the open nature of this UK automotive industry (Bailey *et al.*, 2019). Boer *et al.* (2013) suggest that when investigating ownership origins the implementation of lean would be more evident in foreign-owned firms from developed countries. In this study, the foreign-owned firms were from seven developed countries (Germany, US, Japan, France, Spain, Sweden and the Netherlands) and two emerging economies (China and India), the latter accounting for eight firms, all of which were predominantly implementing lean microfoundations (Table 3). Given the small sample of foreign-owned firms from developing nations, we are unable to test differences between foreign-owned multinationals from developed and developing nations. The majority of foreign-owned firms were from Europe (27), demonstrating the interconnectedness of the UK automotive industry and the continent (Bailey and De Propris, 2017; Bailey *et al.*, 2019). The majority of home-owned firms within the UK automotive industry were found to be implementing agile production; however, logistic regressions were utilised to statistically test this observation, the results of which are reported in Table 4.

Table 3: Lean and Agile Firms Based on Country of Ownership

	Country of Ownership	Lean (Exploitative)	% Lean	Agile (Explorative)	% Agile	Total
Home-Owned	UK	29	34.12	56	65.88	85
Foreign-Owned	Germany	9	69.23	4	30.77	13
	US	9	81.81	2	18.19	11
	Japan	8	88.89	1	11.11	9
	China	6	100.00	0	0.00	6
	France	3	100.00	3	0.00	6
	Spain	3	100.00	0	0.00	3
	Sweden	3	100.00	0	0.00	3
	India	2	100.00	0	0.00	2
	Netherlands	2	100.00	0	0.00	2
Total		74	52.86	66	47.14	140

Model 1 and Model 2 in Table 4 sought to determine if foreign-owned and home-owned firms can be distinguished based upon exploitative and explorative initiatives. Model 1 suggests that when comparing foreign-owned firms to home-owned firms, foreign firms are $(1 - 0.136 = 0.864)$ 86.4 per cent less likely to be implementing agile (explorative) initiatives relative to lean (exploitative) practices. Model 2 illustrates that when comparing foreign-owned firms against home-owned firms, foreign-owned firms are $(7.333 - 1 = 6.331)$ 633 per cent more likely to be implementing lean (exploitative) initiatives relative to agile (explorative) practices. The p value is less than 0.05 for both of these assertions, thus, our results imply that foreign-owned firms operating in the Midlands automotive industry are *significantly* more likely to implement lean and exploitative (efficiency-driven) microfoundations, whereas home-owned firms operating in the same setting are *significantly* more likely to pursue agile and explorative microfoundations. Therefore, based upon these findings, hypotheses **Ha** and **Hb** were supported.

Table 4: Home-Owned versus Foreign-Owned Firms Based upon Lean and Agile Production

Model 1				
(Home-owned is base and lean is reference point)				
Lean/Agile	H/F	B	Sig	Exp (B)
Agile	F (1)	-1.992	.000	.136
	H (0)	.	.	.
Model 2				
(Home-owned is base and agile is reference point)				
Lean/Agile	H/F	B	Sig	Exp (B)
Lean	F (1)	1.992	.000	7.333
	H (0)	.	.	.

Table 5 reports on the number of home-owned and foreign-owned firms at varying levels of the automotive supply chain. Out of a possible 140 firms, 16 firms were OEMs, 36 firms were first-tier suppliers, 32 firms were second-tier suppliers, 33 firms were third-tier suppliers and 23 firms were fourth and fifth-tier suppliers.

Table 5: Home-Owned and Foreign-Owned Firms Distinguished by Supply Chain Position

Lean (Exploitative)	Home-Owned	% Home-Owned	Foreign- Owned	% Foreign-Owned	Total
OEMs	2	16.67	10	83.33	12
1 st Tier	8	30.77	18	69.23	26
2 nd Tier	7	41.18	10	58.82	17
3 rd Tier	8	61.54	5	38.46	13
4 th & 5 th Tier	5	83.33	1	16.67	6
Total	30	40.54	44	59.46	74
Agile (Explorative)	Home-Owned	% Home-Owned	Foreign- Owned	% Foreign-Owned	Total
OEMs	3	75.00	1	25.00	4
1 st Tier	7	70.00	3	30.00	10
2 nd Tier	12	80.00	3	20.00	15
3 rd Tier	17	89.47	2	10.53	19
4 th & 5 th Tier	16	88.88	2	11.11	18
Total	55	83.33	11	16.67	66
Total	Home-Owned	% Home-Owned	Foreign- Owned	% Foreign-Owned	Total
OEMs	5	31.25	11	68.75	16
1 st Tier	15	41.67	21	58.33	36
2 nd Tier	19	59.38	13	40.63	32
3 rd Tier	25	78.13	7	21.88	32
4 th & 5 th Tier	21	87.50	3	12.50	24
Total	85	60.71	55	39.29	140

Models 3 and 4 reported in Table 6 sought to determine whether foreign-owned and home-owned firms can be distinguished based upon the position (tier) at which they operate in the Midlands automotive supply chain. Crucially, due to the small sample of firms belonging to each tier as presented in Table 5, each positional tier was simplified and categorised into three levels; upstream (3rd, 4th & 5th tier suppliers), midstream (2nd tier suppliers), and downstream (OEMs & 1st tier suppliers), which is consistent with Qamar and Hall's (2018) parameters. Model 3 suggests that when comparing foreign-owned firms against home-owned firms, foreign-owned firms are $(1-.508 = 0.492)$ 49.2 percent less likely to be operating midstream relative to downstream. Furthermore, this model found that foreign-owned firms are $(1-.230 = 0.770)$ 77 percent less likely to be operating upstream relative to downstream in the supply chain. However, the p value is less than 0.05 for the second assertion only, thus we can say that foreign-owned firms when compared to home-owned firms are *significantly* less likely to be operating upstream, but only less likely to be operating midstream. In order to calculate the probability at different tiers of the supply chain, in Model 4 we changed the reference point to upstream. Therefore, Model 4 suggests that when comparing foreign-owned firms against home-owned firms, foreign-owned firms are $(4.342-1 = 3.342)$ 334 per cent more likely to be operating downstream relative to upstream.

In addition, foreign-owned firms are ($2.206-1 = 1.206$) 121 per cent more likely to be operating midstream relative to upstream. Importantly, the p value is less than 0.05 for the first assertion only, thus foreign-owned, when compared to home-owned firms, are *significantly* more likely to be operating downstream, but almost significantly more likely to be operating midstream in automotive supply chains relative to upstream. Our proposed hypotheses concerning home-owned and foreign-owned firms focussed on upstream and downstream positions within the automotive supply chains and not on midstream positioning. Consequently, **Hc** and **Hd** were supported.

Table 6: Home-Owned versus Foreign-Owned Firms Based upon Supply Chain Positional Tier

Model 3				
(Home-owned is base and downstream is reference point)				
SC Position	H/F	B	Sig	Exp (B)
Midstream	F (1)	-.677	.138	.508
	H (0)	.	.	.
Upstream	F (1)	-1.468	.000	.230
	H (0)	.	.	.
Model 4				
(Home-owned is base and upstream is reference point)				
SC Position	H/F	B	Sig	Exp (B)
Downstream	F (1)	1.468	.000	4.342
	H (0)	.	.	.
Midstream	F (1)	.791	.086	2.206
	H (0)	.	.	.

6.0 Discussion

Crucially, in terms of the TPRCs utilised to measure the degrees of leanness and agility, no firm was found to score highest within the ‘hybrid’ category, suggesting that regardless of country of ownership and supply chain positioning, firms operating within the UK automotive industry are not pursuing ambidextrous (hybrid) production. Instead firms were pursuing either exploitative (lean) or explorative (agile) microfoundations within their organisations. This in turn supports the notion of a ‘performance paradox’ (Yalcinkaya *et al.*, 2007), as well as the literature concerning trade-offs. The performance paradox literature (Ostroff and Schmitt, 1993; Weigelt and Sarkar, 2012) explains how incompatibilities between contrasting processes and business goals can provide firms with challenges that result in ambidextrous capabilities. Moreover, we corroborate the findings of Koryak *et al.*’s (2018) study of exploration and exploitation in 422 UK firms. Essentially, we argue that a firm’s decision to pursue one strategy in a location, and in turn develop the capabilities associated with exploitative microfoundations (for instance), requires that firm to engage in a performance trade-off resulting in reduced capacity to develop the capabilities associated with the opposing, explorative, microfoundations of the alternate strategy. Ebben and Johnson (2005) had previously found that firms that pursue either efficiency

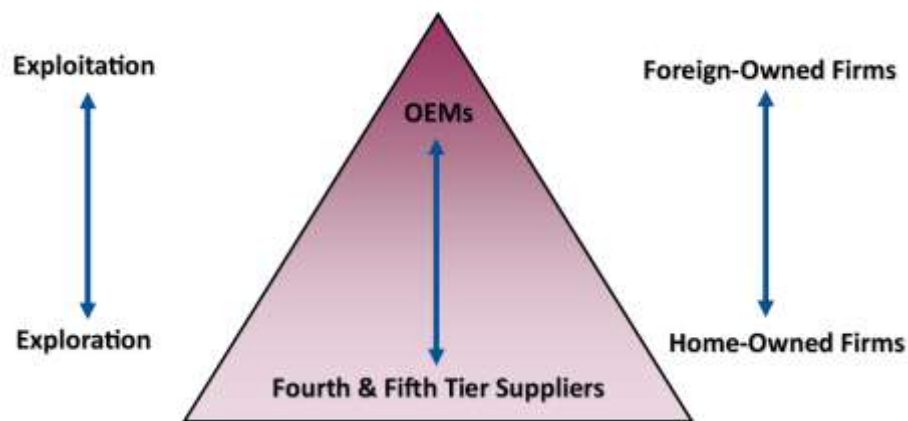
strategies or flexibility strategies outperform those that attempt to pursue both, which may provide an explanation as to why firms in this study were not found to be implementing a hybrid approach. Although we do not find evidence in our study of organisations implementing a hybrid strategy, thus the organisations were not therefore themselves ambidextrous, the presence of exploitative (lean) and explorative (agile) microfoundations across the sample demonstrates that the automotive industry in the Midlands, i.e. the eco-system, *is* in fact an ambidextrous.

The results presented in Tables 4 and 6 illustrate novel findings. Concerning **H_a** and **H_b**, we found that home-owned firms were significantly more likely to adopt agile (explorative) initiatives while foreign-owned firms were significantly more likely to adopt lean (exploitative) initiatives. The implication that foreign-owned firms implement lean TPRCs more successfully than their home-owned peers supports extant literature (Voss and Blackmon, 1996; Beaumont *et al.*, 2002; Rahman *et al.*, 2010; Agarwal *et al.*, 2014). Taking the UK research context into consideration, our results contest the ambiguous findings that exist in the literature (Sila, 2007; Dora *et al.*, 2014) such as that limited differences exist between home-owned and foreign-owned firms with regards to lean TPRCs. In the case of developed economies, which typically possess more mature manufacturing industries, such as the UK, we find that home-owned firms do not necessarily compete on exploitative microfoundations (lean TPRCs), but actually focus on developing capabilities geared toward adaptability via the implementation of explorative microfoundations (agile TPRCs). This is in line with Buckley *et al.*'s (2010) assertion that domestically owned organisations may be more agile and explorative in comparison with foreign-owned ones. Moreover, given that the concept of lean production originates from Japan, it may have been reasoned *a priori* that differences would arise from subsidiaries of foreign-owned firms, originating from different national contexts and with activities dispersed in different country locations. However, the majority of foreign-owned firms from a range of countries were found to be implementing lean TPRCs. Therefore, in line with Bortolotti *et al.*'s (2015) findings, we argue that when operating in the UK the national culture of foreign-owned subsidiaries has little impact on the production strategy employed. Yet, it is important to note that the majority of foreign-owned firms operating in our sample were from developed economies, primarily within Europe.

With regard to **H_c** and **H_d**, we found that home-owned firms were significantly more likely to be operating downstream within the automotive supply chain, whilst foreign-owned firms were significantly more likely to be operating upstream. As home-owned and foreign-owned firms were significantly more likely to be lean and agile respectively, we argue that both home-owned and foreign-owned firms seek to develop different types of competitive advantage. Thus, from an evolutionary perspective, we argue that foreign-owned and home-owned firms have evolved to co-exist within the same industry, but they prioritise different microfoundations of ambidextrous production and occupy distinct positions in the supply chain. This is in line with McCarthy and Tsinopoulos's (2003) assertion

that alternative production strategies exist as firms experience different evolutionary forces. In this sense, we argue that market pressures determine firm routine adaptations, whether they be radical or incremental and consistent with an agile or lean strategy respectively. The performance of those routines determines the ability of the firm to compete within its ecosystem, and thus the position it occupies at a particular tier of the industry’s supply chain. Therefore, this results in heterogeneous production paradigms characterising the industry. The notion that home-owned and foreign-owned firms develop different innovative capabilities enabling them to survive within the same industry is illustrated in Figure 1. The dark shaded area at the top of the pyramid in Figure 1 relates to firms positioned downstream in automotive supply chains; consistent with our findings, it represents the downstream position of the foreign-owned firms that, generally, implemented exploitative (lean) routines. In contrast, the lighter shaded area at the bottom of the pyramid relates to firms positioned upstream in automotive supply chains, who primarily implemented explorative routines.

Figure 1: Home-Owned & Foreign-Owned in UK Automotive Supply Chains



As firms operating downstream in the Midlands automotive industry were generally foreign-owned, we reaffirm the Midlands region’s openness to international investment (Bailey *et al.*, 2019) as well as its ability to attract capital, in contrast to other global automotive cluster regions. Despite its history of poor industrial relations and intense global competition, which could have encouraged firms to (re)locate elsewhere, we argue that these local dynamics ‘train’ upstream firms to be competitive. One of the ways in which upstream firms achieve competitiveness, which is captured in this paper, is the pursuit of explorative initiatives that capitalise on their critical success factors (MacNeil and Bailey, 2010) to protect and nurture their competitive strengths. As the OEMs and first-tier suppliers in our sample were predominantly foreign-owned, we argue that these MNEs typically possess a large pool of resources (Shah and Ward, 2003; Dora *et al.*, 2013) and purposely position themselves downstream in complex supply chains, to gain influence over their upstream suppliers (who are more likely to be home-owned) and exploit them. Given this, it is not necessary for MNEs to possess or invest in developing endogenous explorative practices, as their primacy allows these organisations to exploit the explorative

initiatives already occurring upstream in the supply chain. Thus, these MNEs are not internally ambidextrous (rather they are both endogenously and exogenously exploitative), but given their supply chain position, they are able to acquire ambidextrous capabilities externally. This is in line with Almeida's (1996) assertion that foreign multinationals source innovative ideas from local companies.

Nelson and Winter (1982) state that the superior performance of routines rewards firms with competitive advantage over their rivals; however, we argue that it is not just the performance of routines that is critical to a firm's success, but also the choice of routines pursued. A firm must implement appropriate microfoundations, which are coherent with and aligned to that firm's specific contextual factors, and consider how those microfoundations relate to its overall value proposition and its embedded position within its network. Once those routines have been selected, the development of superior execution is necessary to ensure advantage over rivals, through the transformation of a repeated action sequence to a capability for the firm.

The idea that MNEs do not seek to initiate explorative activities themselves outside their home country is consistent with the fact that foreign investment is a risky and uncertain use of capital and resources (Chebbi *et al.*, 2013). Strange (2018) has recently argued that all strategic decisions made by firms are a result of the interaction between various stakeholders; namely both shareholders and the Top Management Team, who are likely to be the most risk-averse as well as most influential actors. As such, key decision-makers and influential actors within large international companies would not be predisposed to advocate the pursuit of high-risk investment opportunities in a foreign location. However, it is not just the risks associated with the use of firm capital resources that may inhibit international firms from undertaking exploration in a host location. While it may be true that MNEs are increasingly dispersing their innovative activities across geographic space (Hannigan *et al.*, 2015) the risk of competitors acquiring commercially sensitive, tacit knowledge through linkages to collocated firms remains a threat. From a managerial perspective, the safest approach to mitigate this threat is to centralise and concentrate most basic and strategic research close to HQ in the home country (Giroud and Scott-Kennel, 2009; Pavlinek, 2012; Pavlinek, 2018). This is especially true as "openness" to external ideas is becoming an increasingly prominent feature of organisations (Chesbrough, 2003; Santangelo *et al.*, 2016), for example, some MNEs have subsidiaries whose specialised function is that of a "scouting unit" to access external knowledge (Monterio and Birkinshaw, 2017).

Thus, the findings of this study lend support to the idea that foreign-owned firms are less likely than domestic firms to engage in explorative practices as a result of the higher levels of uncertainty and diminished returns typically involved. This suggests that the owners of foreign firms operating in the Midlands automotive supply chain, i.e. their shareholders, are unwilling to bear the costs of uncertainty and are more interested in asset exploitation and incremental innovations, e.g. the refinement of existing

processes and products. This, in summary, is the basis of the argument stated in this paper: foreign-owned firms internationalise into the UK automotive industry to exploit the explorative initiatives pursued by home-owned firms at lower levels of the automotive supply chain.

7.0 Conclusion

The regional, and in turn the spatial, nature of ambidexterity has not been extensively explored (Geerts *et al.*, 2018) and in particular, the relationship between different ambidextrous strengths relative to whether firms are home-owned or foreign-owned within a given space has been neglected (Boer *et al.*, 2013). Moreover, there is a need to better-understand whether home-owned and foreign-owned firms not only implement alternative routines, but whether these two types of firms operate at different tiers within supply chains. To address this gap in the literature, we theoretically ground our propositions on CT and make a number of important contributions.

First, our findings reveal that no firm was engaged in ambidextrous (hybrid) production; thus, the findings presented in this context illuminate the misconception that firms simultaneously pursue both exploitative and explorative manufacturing processes. Rather, we find that firms are adopting either a predominantly lean (exploitative) or predominantly agile (explorative) strategy. These results support the existence of a microfoundation paradox (Ebben and Johnson, 2005; Koryak *et al.*, 2018). Second, we find that home-owned firms were significantly more likely to be competing based on explorative (agile) microfoundations, whilst foreign-owned firms were significantly more likely to competing on the basis on exploitative (lean) microfoundations. The final contribution involves broadening the application of ambidexterity beyond the organisational unit (Kristal *et al.*, 2010; Blome *et al.*, 2013a) to encompass supply chains. We find that foreign-owned firms, which were more likely to prioritize exploitative microfoundations, were significantly more likely to be operating downstream in the automotive supply chain, contrary to home-owned firms, which were more likely to prioritize exploitative microfoundations, and which were found to be significantly more likely to be operating upstream in the automotive supply chain. In the context of the UK automotive industry, these findings contest the notion that innovation, in the form of adaptability, is an *internal* driver of firm internationalisation (Cao *et al.*, 2018). Yet, as the majority of MNEs occupy downstream supply chain positions in the Midlands automotive industry, we argue that foreign-owned firms are able to *indirectly* achieve ambidextrous capabilities. We assert that foreign-owned firms internationalise into the UK automotive industry to exploit the explorative initiatives of home-owned firms, which are operating upstream in the supply chain. Our theoretical contributions not only reaffirm CT, but we also argue that home-owned and foreign-owned have evolved to prioritise different production strategies, thus routines, and occupy distinct positions in automotive supply chains, which enables both types of firms to co-exist

within the same eco-system. Thus, we acknowledge Collinson's (2017) call for more interdisciplinary and legitimate IB research, by bridging the discipline with both OM and SCM in this study.

For practitioners, we present a novel methodology that can assist in determining whether firms are exploitative (lean) or explorative (agile) based upon their deployment of particular TPRCs, as well as clarifying certain misconceptions with regard to the lean-agile debate in extant academic literature. Importantly, the idea that firms can implement lean and agile practices to an equal extent is refuted, dispelling the existence of ambidextrous firms within this context. Rather, it is asserted that decision-makers in the automotive industry need to prioritise the routines most important to their respective firm vis-à-vis its contextual factors to enable them to identify and enact the most suitable production strategy.

Nevertheless, there are a number of limitations to this study. First, as the research was designed as an in-depth study of the Midlands (UK) automotive sector, future studies should extend the home-owned/foreign-owned argument by investigating automotive supply chains in other countries or regions, particularly in other developed economies. This study's analysis was based on the results from 85 home-owned and 55 foreign-owned firms, thus future studies that seek to extend the home-owned/foreign-owned argument should investigate a larger sample. Given that the majority of foreign-owned firms were from developed economies, it would be beneficial if future studies sought to explore the production trade-offs between MNEs from developed and developing economies that are operating in developed economies. Furthermore, although 22 TPRCs associated with lean and agile production were explored, extending the analysis to include more lean and agile practices would be beneficial. Table 1 provided an insight into the production strategies that firms can enact, but this represents just a small selection of the microfoundations a firm could be pursuing. Therefore, investigating more TPRCs would provide a deeper insight into whether the balance between exploitative and explorative practices within firms is as unequal as our findings suggest, or if hybrid, ambidextrous organisations exist within other contexts. Finally, Brown and Eisenhardt (1997) asserted that firms oscillate between periods of exploitative activity and explorative activity, but we provide a temporally situated account of our case industry. Thus, future research should seek to provide a longitudinal account of firm orientations to extend our conceptualisation of supply chain ambidexterity as contingent on contextual factors.

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Appendix

Survey

Question 1)

Please indicate whether your organisation is a:
(Please **only** tick **one** box accordingly)

a) UK owned firm	<input type="checkbox"/>
b) Foreign owned firm	<input type="checkbox"/>

If **foreign owned** please can you indicate the country of ownership

.....
.....

Question 2)

How many workers are employed within your organisations?
(Please **only** tick **one** box accordingly)

c) 0 - 50	<input type="checkbox"/>
d) 51 - 250	<input type="checkbox"/>
e) 250+	<input type="checkbox"/>

Question 3)

What tier would you class your organisation belonging to within the automotive supply chain?
(Please **only** tick **one** box accordingly)

a) OEM	<input type="checkbox"/>
b) 1 st Tier	<input type="checkbox"/>
c) 2 nd Tier	<input type="checkbox"/>
d) 3 rd Tier	<input type="checkbox"/>
e) 4 th Tier & 5 th Tier	<input type="checkbox"/>
f) Other	<input type="checkbox"/>

If **other** please can you provide a description

.....
.....

Question 4)

Manufacturing organisations use a variety of concepts in order to meet performance objectives, please can you state which manufacturing concept your organisation is **pursuing** to a **greater** extent?

Lean Manufacturing: Lean manufacturing involves never ending efforts to eliminate or reduce waste (improve efficiency) concerning design, manufacturing, distribution, and customer service.

Agile Manufacturing: Agile manufacturing is a term applied to an organization that has created processes, tools, and training to enable it to respond quickly to customer needs and market changes.

Leagile (Hybrid) Manufacturing: A combination of both lean and agile manufacturing.

(Please **only** tick **one** box accordingly)

a) Lean manufacturing
b) Agile manufacturing
c) Leagile (Hybrid) manufacturing

If **other** please can you provide a description

.....

.....

.....

.....

.....

Question 5)

There are a number of production tools, practices, routines and concepts (TPRCs) associated with manufacturing; please can you indicate the extent to which each technique and practice is adopted within your organisation:

(Please **only** tick **one** box corresponding to each row)

	1 None/Zero	2 Low Levels	3 Moderate Levels	4 Reasonably High Levels	5 High Levels
a) Elimination of waste					
b) Continuous improvements					
c) Zero defects					
d) Production smoothing					
e) Line balancing					
f) Value stream mapping					
g) Total productive maintenance					
h) 5s					
i) Just-in-time					
j) Kanban					
k) Multi-functional machines					
l) Multi-functional teams					
m) Total quality management					
n) Employee empowerment					
o) Single minute exchange dies					
p) Virtual enterprise					
q) Concurrent engineering					
r) IT-driven enterprise					
s) Rapid prototyping					
t) Reconfiguration					
u) Core competence management					
v) Knowledge-driven enterprise					