



Investigating Dynamic Capabilities, Agility and Knowledge Management within EMNEs- Longitudinal Evidence from Europe

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Abstract

Purpose: This paper analyses the impact of dynamic capability (DC) of emerging market multinationals (EMNEs) on their firm technological performance by teasing out the concepts of agility and knowledge management (KM) through DC.

Design/methodology/approach: Evidence from this study is contextualised on EMNEs that operate in the UK, Germany and France. The investment in intangible assets through which EMNEs are able to develop their DC over the period 2005-2016, is examined and how this leads to increased firm technological performance, is investigated.

Findings: Results show that higher investments in DC allows EMNEs to be more agile and gain competencies through KM and thereby sustain competitiveness in the three leading European countries. This research also identifies which EMNE groupings show greater technological performance and how such EMNE groupings are able to translate dynamic capabilities into greater technological performance compared to others over time. In summary, the role of DC during of the global financial crisis was also examined, where they are required to be more agile.

Originality/value: This paper sheds light on a novel way and motivation of successful EMNEs in using developed host countries as a location for generating DC through agility and KM.

Keywords: Dynamic Capabilities, Agility, Knowledge Management, Emerging-country Multinational Enterprises (EMNEs), UK, Germany, France, Resource-based-theory

1. Introduction

In the latest global rankings for FDI recipients, the United Kingdom, Germany and France were ranked 3rd, 4th and 5th respectively (UNCTAD, 2017). The OECD countries in the EU and North America have traditionally made up the largest share of inward investors into these countries, in terms of FDI stocks (Bundesbank, 2012). However, a more recent trend is that the share of EMNEs FDI into European developed countries such as the UK, Germany and France has risen constantly over the last decade, although from a lower base. This important aspect has not been researched as much in the literature.

Thus, a major limitation of the existing literature in this area has been the focus on “North-North” FDI, focussing on inter-EU investment with the addition of US affiliates (Blonigen and Piger, 2014). This typically is data driven, with historic data only including small amounts of FDI from EMNEs, and even then much of the firm level data that is required is missing. Apart from data limitations that can capture the heterogeneity of FDI flows, this has led to limitations from a conceptual perspective, in the sense that any analysis includes mostly FDI that is market seeking in its motives and driven by its firm-specific advantages. Incorporating FDI from emerging and developing countries into technologically advanced countries such as the UK, Germany and France are more likely to capture technology sourcing FDI, as well as market seeking FDI. This distinction is important when discerning any variation in performance across firm types (Driffield and Love, 2006; Rice, Liao, Galvin and Martin, 2015). Therefore, such analysis requires updating, in order to include investments from EMNEs and to trace the changes (e.g. Trahms, Ndofor and Sirmon, 2013) through time.

Further, the existing literature is rather static in showing which firms are, on average, more productive, but says little subsequently on the drivers of this productivity, through

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3 important and relevant factors such as dynamic capabilities, agility and knowledge
4 management (e.g. Schilke, 2014). This is particularly important in terms of the debates on the
5 extent to which inward investment generates productivity growth, or the types of inward
6 investment countries should attract in order to generate post crisis growth. For example,
7 productivity growth can be generated through intangible asset accumulation or the need for
8 firms to generate cash flow endogenously in order to finance productivity growth.
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16 Building on the existing and relevant work (on the topic of EMNEs, knowledge
17 management, dynamic capabilities and agility) in this journal (e.g. Bamel and Bamel, 2018;
18 Dove, 1999; Chen, Duan, Edwards and Lehaney, 2006; Denford, 2013; Guo,
19 Jasovska, Rammal, and Rose, 2018; Malik, 2004; Nielsen, 2006; Pérez-Bustamante, 1999;
20 Taghizadeh, Rahman, Hossain, 2018), this paper thus offers the following contributions.
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22 Firstly, we examine the dynamic capabilities, agility and knowledge management within
23 emerging market multinationals (EMNEs) (see e.g. by Williamson, 2016 on Chinese firms),
24 in Europe, with evidence from UK, Germany and France (EMNEs), before, during and after
25 the recovery from the recent global financial crisis of 2008. Second, we contribute by
26 investigating the impact of investments in dynamic capabilities (e.g. Barreto, 2010; Helfat
27 and Peteraf, 2003; 2011) by EMNEs in developed countries on its technological performance,
28 over time (2005-2016). Third, we further dig deeper to identify which EMNE groupings
29 show greater technological performance and how such EMNE groupings are able to translate
30 dynamic capabilities into greater technological performance compared to others,
31 longitudinally over time (Barreto, 2010; Rice et al, 2015). Lastly, our paper contributes by
32 investigating how EMNEs with dynamic capabilities show greater agility and how EMNEs
33 from certain groupings show greater agility as compared to others, over time.
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52 The rest of the paper is structured as follows. First, we review the literature on DC,
53 agility and knowledge management and derive our hypotheses through the lens of RBT and
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3 deliberate learning investments. The next section explains our empirical research design and
4 describes our data sample and variables. We then present and discuss our findings. This is
5 followed by a conclusion where we discuss the implications of our findings with regards to
6 advancing the literature on DC by emerging market firms in advanced European countries
7 and outline limitations of this paper which may offer avenues for future research.
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16 **2. Literature Review and Hypothesis Development**

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18 In the face of relentless competition and uncertainties, firms are advised to constantly adapt,
19 renew, re-configure and re-create their resources and capabilities to survive and prosper
20 (Barney, 2001). In this context, the concept of dynamic capabilities (DC) has become a
21 central research area in the strategy literature, including knowledge and innovation (Teece,
22 2006). Further, Teece et al.'s (1997) seminal work paved the way to numerous scholars from
23 different research backgrounds to use different theoretical perspectives to explore the nature
24 of DC. Therefore, despite the popularity of the concept, the literature remains fragmented
25 (see Ambrosini and Bowman, 2009). Notwithstanding this fragmentation, scholars concur
26 that DC are 'higher order capabilities' that allow for collation, creation and dissemination of
27 knowledge; continuous updating of operational processes; dynamic interaction with the
28 environment and reflexivity in decision making (Easterby-Smith et al., 2009).
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43 Interestingly, although Teece et al's (1997) seminal paper on the DC highlights the
44 work of Nelson and Winter (1982) on *Evolutionary Theory of Economic Change*, Pavlou and
45 El Sawy (2006) suggest that emergence of DC comes from "Schumpeterian competition"
46 where competitive advantage is associated with the "creative destruction" of existing
47 resources and "novel combination" of the resource based theory (RBT) (Barney, 2001;
48 Metcalfe, 1998). Consistent with this view, DC are seen as originating from the RBT of the
49 firm (Nielsen, 2006) and while RBT of the firm chiefly concerns selecting and combining
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3 resources (Ferreira and Fernandes, 2017), DC stresses renewing and reconfiguring existing
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5 resources (Karim, 2006). Seen through this lens, DC is an extension of the RBT and
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7 organisation performance is influenced by the “capacity” of a firm to accumulate, deploy,
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9 refresh and reconfigure resources and competencies to match alterations in the external
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11 environment (Teece et al, 1997; Eisenhardt and Martin, 2000; Pandza et al, 2003; Lee and
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13 Slater 2007; Griffith et al, 2006; Wilson and Daniel, 2006; Smart et al, 2007; Wang and
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15 Ahmed, 2007; Lee and Kelley, 2008; Rice et al, 2015).

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18 Therefore, Helfat et al. (2007) assert that that reconfiguration of tangible and
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20 intangible assets is at the heart of dynamic capabilities construct. They define dynamic
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22 capabilities as “the capacity of an organisation to purposefully create, extend, or modify its
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24 resource base.... The ‘resource base’ of an organisation includes tangible, intangible and
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26 human assets (or resources) as well as capabilities which the organisation owns, controls, or
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28 has access to on a preferential basis”. Simply put, DC are the ability of the organisations to
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30 use their respective organisational processes to change the firm’s resource base (see for
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32 instance: Ambrosini and Bowman, 2009, p.5; Penrose, 1959; Priem and Butler, 2001). In this
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34 context, Zollo and Winter (2002) posit that the role of DC, in essence, is to reconfigure firm
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36 specific intangible assets such as organisational knowledge over a period of time. Hence, the
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38 influence of deliberate learning investments, knowledge accumulation and articulation are
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40 central to DC contributing to the firm performance (Rice et al, 2015). They assert, “a
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42 dynamic capability is a learned and stable pattern of collective activity through which the
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44 organization systematically generates and modifies its operating routines in pursuit of
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46 improved effectiveness” (2002, p.340). Similarly, Bergman et al (2004) believe that learning
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48 and knowledge creation are fundamental to the generation of DC while Nielsen (2006, p.65)
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50 views DC as “concrete and well known knowledge management activities” of the firm where
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52 “the performance of a firm is dependent on the ability to exploit its integrated knowledge
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resources". In this paper, we concur with the view that reconfiguration of intangible assets through deliberate learning investments (i.e. training and learning investments) and protection of intellectual property rights (Augier and Teece, 2007; Harreld et al, 2007) lead to greater firm performance.

While the RBT has been viewed an influential framework that accounts for performance differences across the firms based on firm specific assets (Barney, 1996; Wright et al, 1994; Grant, 1996; Peteraf and Barney, 2003; Wiklund and Shepherd, 2003; Beard and Sumner, 2004; Barney and Clark, 2007), the RBT fails to elaborate how reconfiguration of these resources over time can account for enhanced performance as a response to changes in the external market. In this respect, DC is viewed as an extension of the RBT that explains how reconfiguration of firm specific assets could lead to greater performance and competitive advantage (Teece et al, 1997; Zott, 2003; Janutnen et al, 2005; Zahra et al, 2006; Teece, 2007, 2012; Wang and Ahmed, 2007; Helfat and Peteraf, 2009, 2011; Wilden et al, 2013).

Nonetheless, while many previous research of the DC-performance has focused on theoretically advancing this relationship, very few studies have attempted to empirically assess the mediating role of dynamic capabilities on performance (Zahra et al, 2006; Ambrosini and Bowman, 2009; Arend and Bromiley, 2009; Giudici and Reinmoeller, 2012). Helfat et al (2007) allege that to understand the DC-performance relationship, it is imperative that one must assess how much value DC really creates. An organisation could gain advantage if its DC create higher value than competing firms (Helfat et al, 2007). This, however, by no means confirms that DC necessarily lead to superior performance. Similar to competitive advantage based on the RBT, there are several conditions to be met in order for DC to be considered the source of competitive advantage. The first condition is that the same DC must exhibit heterogeneity in the technical fitness (Helfat et al, 2007); secondly, the application of dynamic capabilities must be in demand since they only have value when in

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3 use and competitive advantage could only be generated when dynamic capabilities are
4 applied. Finally, similar to VRIO resources, dynamic capabilities must be rare simply
5 because no competitive advantage could be generated if firms possess similar DC. Consistent
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7 with their view, assessing performance is a useful way to evaluate the value creation of DC
8 relative to competitive advantage.
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14 Helfat et al (2007) argue that performance differences across firms could be explained
15 by differences across DC of competing firms. Other research on the DC-performance
16 relationship have demonstrated the contribution of DC to firm performance and competitive
17 advantage through asset reconfiguration. For instance, Harreld et al (2007) believe that IBM's
18 remarkable transformation to success has been due to various reasons, but one of the main
19 reasons has been their ability to identify and seize opportunities and to reconfigure the firm
20 specific assets to achieve superior performance. Harreld et al (2007, p.41) conclude that:
21 "sustained competitive advantage comes from the firm's ability to leverage and reconfigure
22 its existing competencies and assets". Similarly, Wu (2007) in the study of entrepreneurial
23 resources, dynamic capabilities and start-up performance of Taiwanese high tech companies
24 evaluates the relationship between asset reconfiguration dynamic capabilities and
25 performance. Wu's (2007) study evaluates the resources and performance of start-ups in a
26 rapidly changing market. By using data from Taiwanese high tech companies, it investigates
27 and demonstrates that DC were significantly helping to leverage entrepreneurial resources to
28 benefit start-up performance, and illustrates that through asset reconfiguration, DC
29 contributed towards firm's performance.
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50 Other research has also argued how DC lead to greater performance over time (Zollo
51 and Winter, 2002; Macher and Mowery, 2009; Drnevich and Kriauciunas, 2011; Prange and
52 Verdier, 2011; Protogerou et al, 2012; Wilden et al, 2013; Lin and Wu, 2014; Teece, 2012,
53 2014 (a); Wang et al, 2015). Furthermore, recent studies have highlighted the significant role
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of DC in MNEs (Teece, 2012, 2014 (b); Vahlne and Ivarsson, 2014; Lessard et al, 2016) and asset seeking EMNEs (Parthasarathy et al, 2017). When MNEs extend their international activities, their success is not only dependent on the portfolio of resources they possess but also on their ability to continuously modify their resource base (Li, 1998; Prange and Verider, 2011). In this vein as Teece (2007, 2009, 2012 and 2014) argues that DC are particularly relevant to studies of MNEs performance because such firms operate in fast changing global markets.

Nonetheless, the examples of studies investigating the role of DC in EMNEs is very limited. In this paper, we strive to advance the current understanding of DC-performance relationship in EMNEs. More specifically, we show technological performance differences of EMNEs in Germany, France and UK before, during and in the post global financial crisis of 2008. The arguments above lead to the following hypotheses for our empirical work:

Hypothesis 1a: *The higher the investment in dynamic capabilities by EMNEs in developed countries, the greater the EMNE's technological performance over time.*

Hypothesis 1b: *EMNEs from certain groupings show greater technological performance compared to others over time.*

Hypothesis 1c: *EMNEs from certain groupings are able to translate dynamic capabilities into greater technological performance compared to others over time.*

Although the concept of strategic agility was introduced about two decades ago, it is only recently, particularly in the backdrop of financial crisis and subsequent socio-political, technological and economic uncertainties, that it has attracted renewed interest from academic scholars (Adler et al., 1999; Grewal & Tansuhaj, 2001; Judge & Miller, 1991; Tallon and Pinsonneault, 2011; Weber and Tarba, 2014). Organisational agility is often

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3 conceptualised as the “ability to remain flexible in facing new developments, to continuously
4 adjust the company’s strategic direction, and to develop innovative ways to create value”
5 (Weber and Tarba, 2014). Other organizational theorists have associated organisational
6 agility to its ability to remain flexible and adaptable in the face of changing internal and
7 external circumstances (Worley et al, 2014; Teece et al., 2016). Although uncertainty has
8 always been a feature of business environment, highly advanced and integrated global
9 economy means the external shocks have become more frequent and the implications are not
10 well predictable. Thus, organisations possessing strategic agility should have the ability to
11 change the course of its actions more frequently and more effectively. Agile organisations,
12 according to Weber and Tarba (2014:13) those that “have the ability to initiate continuous
13 renewal that includes adapting existing competencies to an ever-changing environment and
14 simultaneously reconfiguring themselves in order to survive and thrive for the long term”. In
15 other words, firms that successfully cope with strategic discontinuities and disruptions are the
16 ones, which possess amongst others high level of organizational flexibility and processes to
17 capture, integrate and produce knowledge.
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36 As previously noted, one of the key arguments underpinning dynamic capabilities is
37 that they positively influence organisational performance (Zollo and Winter, 2002; Macher
38 and Mowery, 2009; Drnevich and Kriauciunas, 2011; Prange and Verdier, 2011; Protogerou
39 et al, 2012; Wilden et al, 2013; Lin and Wu, 2014; Wang et al, 2015). They also create
40 conditions for firms to thrive by responding to change and uncertainty from the external
41 environment (Teece et al, 1997; Eisenhardt and Martin, 2000; Pandza et al, 2003; Lee and
42 Slater 2007; Griffith et al, 2006; Wilson and Daniel, 2006; Smart et al, 2007; Wang and
43 Ahmed, 2007; Lee and Kelley, 2008). During crises, many underlying forces in the industry
44 could change at a rapid pace and dynamic capabilities are key to superior performance in fast
45 changing industries (Teece et al, 1997; Teece, 2014a, Pezeshkan et al, 2016). In fact, research
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3 has suggested that dynamic capabilities are more applicable and in demand during regimes of
4 rapid change such as financial crisis (Newey and Zahra, 2009; Ambrosini et al, 2009).
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7 However, although previous studies have suggested that dynamic capabilities afford an
8 organisation the ability to achieve congruence with the external environment (Fainshmidt et
9 al., 2017), examples of empirical studies of dynamic capabilities during crises are rare¹.
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14 Given the tripartite micro-foundations (sensing, seizing, reconfiguring) of dynamic
15 capabilities focusing on the ability of the firm to reconfigure their resource base in response
16 to external challenges, therefore the application of dynamic capabilities is particular relevant
17 to studies and actions of firm performance during crisis. It is in this backdrop that Teece et
18 al., (2016) have attempted to present the relationship between dynamic capabilities and
19 organisational agility. In doing so, they aim to bring on board the role of managerial
20 cognition and decision making by CEOs and senior managers, who at a critical juncture have
21 to make sense of key developments and delineate the response of the firm. Thus, they
22 conceptualise organisational agility as a distinct dynamic capability that helps a firm manage
23 environmental uncertainties.
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37 Nonetheless, no study has investigated the effectiveness of EMNEs' dynamic
38 capabilities and in that respect, organisational agility during crisis and consequently, our
39 second hypothesis is formulated as follow:
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44 **Hypothesis 2a:** *EMNEs with higher dynamic capabilities show greater agility over*
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46 *time.*
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50 **Hypothesis 2b:** *EMNEs from certain groupings show greater agility as compared to*
51 *others, over time.*
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54 ¹ More recently, some studies have focused on the role of dynamic capabilities during crises. For instance, Nair
55 et al (2013) found that Enterprise Risk Management (ERM) as a dynamic capability allowed firms to respond
56 more effectively to the financial crisis of 2008. Similarly, Makkonen et al (2014) found that dynamic
57 capabilities allowed firms to perform better during the 2008 financial crisis.
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3. Research Design

The data for our analysis is drawn from *ORBIS*, which is a commercially available database of annual accounts. A unique feature of the data set is the identification of foreign-owned firms, where the nationality of a firm is determined by the ultimate owner's country of ownership (see Temouri et al., 2008 or Geishecker et al., 2009 for a more detailed discussion of *ORBIS*²). We include firms for which we have information on our key variables, such as the factor inputs to estimate firm performance as total factor productivity (TFP). We have a panel of firms over the period 2005-2016 across the manufacturing sector and services sector. All variable definitions and summary statistics are presented in Appendix 1.³

Table 1 shows the distribution of EMNEs across Germany, France and the UK and the regions of foreign ownership. The share of EMNEs in the UK is the largest with 1,669 firms, followed by France (1,340) and Germany (1,119). EMNEs from BRICS countries represent the largest number of firms in Germany and France, with the exception of EMNEs from Commonwealth countries in the UK. The number of EMNEs for Eastern and Central Europe is largest in Germany and EMNEs from former French colonies are mostly concentrated in France, as expected. Countries which we have not grouped for our analysis are captured by countries labelled 'Rest of emerging countries'.

[Insert Table 1]

In estimating firm performance, we rely on firm level total factor productivity (TFP) which is an economic concept and essentially measures technological or efficiency improvements of

² For a discussion comparing such data with other data sources, see Ribeiro et al. (2010).

³ The Orbis dataset will list small firms. However, we had to exclude these as they do not report all the variables needed in our analysis. In Germany, small firms of up to 10 employees or total assets of up to 350,000 euros or annual revenues of 700,000 euros are exempted from full accounts disclosure and may report limited financial statements.

firms not attributable to traditional inputs such as labour and capital used in production. We utilise TFP as our dependent variable in linking what impact DC development has on it before the global financial crisis (2005-07), during the global financial crisis (2008-2012) and also immediately after the global financial crisis (2013-2016). We use the Levinsohn and Petrin (2003) approach to address endogeneity in input concerns. We divide the source countries of EMNEs into five region categories: (a) BRICS, (b) MINT (c) Eastern Europe (d) French colonies and (e) Commonwealth. There is a literature that focuses on the drivers of productivity, in terms of the importance of intangible assets (see for example Griffith et al., 2006; Corrado et al., 2013). We therefore borrow from this literature and posit the following equation to explain the different drivers of TFP across our different groups of firms, linked to the motivation for firms to undertake FDI, across location, sector and home country:

$$tfp_{it} = \alpha + \beta_1 \text{intangibles} + \beta_2 \text{Group} + \beta_3 \text{Group} * \text{intangibles} + \alpha_i + \mu_t + e_{it} \quad (1)$$

The key variable is intangible assets. The focus on intangible assets, builds on the wider literature that seeks to empirically investigate the role and contribution of intangible investment on the growth of the 'knowledge economy' (Corrado et al., 2013). Intangible assets are also used in work seeking to operationalise ideas around knowledge capital or firm specific assets (Blonigen et al., 2003). The relationship between intangible assets and productivity therefore illustrates how locally generated knowledge or technology is translated into productivity growth. For example, the standard analysis of the MNE assumes that, apart from resource seeking, there are essentially two motives for a firm entering a given location. Knowledge exploiting, where the firm seeks to exploit knowledge or technology generated within the parent company in a new location, or knowledge sourcing, where the MNE seeks to invest in a location in order to acquire knowledge in a given location. Indeed, Driffield and Love (2006) demonstrate the importance of this distinction in terms of the likely social

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3 returns to that investment, and also, for the UK, demonstrate how this differs by country of
4 ownership (Driffield and Love, 2005). However, while the data for both of these studies is for
5 the UK, and analysed at the aggregate level, it does highlight the key distinction between
6 what is essentially transatlantic investment, and investment into Europe from the emerging
7 economies.
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14 The typical approach to estimating (1) – see Temouri et al. (2008) for a discussion of
15 this literature, is to estimate this with a set of ownership dummies to capture the
16 heterogeneity, and determine the ordering in terms of productivity. Our focus however is to
17 estimate this model for each group separately to examine differences in the drivers of
18 productivity across the different groups of firms in Germany. The rationale for doing this is to
19 provide information on the drivers of productivity growth within the German, French and UK
20 economy for the pre-crisis, crisis and recovery period. The focus is on the comparison of the
21 determinants of productivity growth, and in particular the interactions between the drivers of
22 productivity growth and ownership type.
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34 We start with the three groups of EMNEs point, contrasting the relative importance of
35 DC to drive productivity growth. This builds on the literature that follows Hansen (2000) in
36 linking internal resources to productivity growth.⁴ A positive relationship between DC and
37 productivity suggests that knowledge capital is generating productivity growth at the firm
38 level. These effects are expected to vary across country/region of ownership.
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46 A similar pattern is expected across country of ownership, with firms from more
47 technologically advanced EMNE countries are more reliant on intangible assets to generate
48 productivity growth than firms from emerging and developing countries, who are more likely
49 to focus on cash flow. This is consistent with the analysis of outward FDI by emerging
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56 ⁴ For a wider discussion of this literature see Corricelli et al. (2012).
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3 market firms, which is driven by cash flow generated at home, and the desire to access global
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5 technology (Ramamurti, 2012)
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8 We subsequently add another dimension to capture the crisis periods, namely the pre-
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10 crisis period (2005-07), the crisis period (2008-12) and then the post crisis period (2012-16).
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12 The focus here is to test, not simply whether productivity growth was faster or slower during
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14 these periods, but to test tests whether knowledge, in the form of intangible assets contributed
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16 relatively more to productivity growth in the post crisis period for any group.
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22 **4. Findings and Discussion**

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24 Table 2 reports the results of equation (3) for Germany, followed by results for France and
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26 the UK in tables 3 and 4, respectively. All specifications are estimated separately for the
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28 before-, during- and post-crisis period, in order to uncover potential differences in the impact
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30 of DC on technological performance across firm types.
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34 Our first main result offers evidence in support of hypothesis 1a and 2a. More
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36 specifically, the coefficients on DC are all positive and statistically significant. This means
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38 that the higher the investment in dynamic capabilities by EMNEs in the three developed
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40 countries, the greater the EMNEs technological performance in general (i.e. H1a) as well as
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42 over the three phases (i.e. H2a). Thus, evidence from our study demonstrates that the
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44 investment in organisational knowledge and learning have resulted in DC which in turn
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46 contributes to greater technological performance (Bergman 2004; Nelson 2006; Zollo and
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48 Winter, 2002).
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52 Having established a clear link between DC investments and greater technological
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54 performance, we now test hypothesis 1b by identifying certain groupings of the EMNEs that
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3 show greater technological performance as compared to other EMNEs over the three phases.
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5 This can be seen in the second row of each table for Germany, France and the UK. For
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7 Germany, the coefficients for BRICS and MINT EMNEs are positive and statistically
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9 significant before the crisis, but are only positive for MINT during the crisis period, whereas
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11 both for BRICS and MINT, they show no discernible difference in the post crisis period. In
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13 terms of Central and Eastern Europe, we consistently find a lower tech performance
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15 throughout the three phases. This offers some evidence for the nature of the firms from
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17 Central and Eastern Europe who perform less well even though they enjoy geographical and
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19 cultural proximity.
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23 For France, both EMNEs from BRICS and former French colonies are less
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25 technologically advanced than other EMNEs which is consistent throughout the three phases.
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27 For the UK, EMNEs from BRICS more technologically advanced (during and post crisis
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29 period) whereas EMNEs from the Commonwealth show no discernible difference in terms of
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31 their performance, which again is consistently observed throughout the three phases. The
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33 group of EMNEs from MINT countries are no different in their technological performance as
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35 compared with the other EMNEs in the case of France and the UK. This offers some
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37 supporting evidence to hypothesis 1b, which states that EMNEs from certain groupings show
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39 greater technological performance compared to others over time.
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43 With regards to our evidence for testing hypothesis 1c, this is shown in the third row
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45 of each table. In Germany, EMNEs from Central and Eastern Europe show consistently
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47 positive and statistically significant coefficients, which means that they are able to translate
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49 dynamic capabilities into greater technological performance as compared to others over the
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51 three phases. We attribute this to the fact that they operate from a lower technological base as
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53 compared to others (shown in row 2), which means that they utilise learning and experience
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55 in becoming more efficient. At the same time, EMNEs from BRICS show no discernible
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3 difference in translating DC into higher tech performance, which could be due to the nature
4 and level of their industry affiliation and technological background. However, it is interesting
5 to uncover negative and statistically significant coefficient for EMNEs from MINT countries
6 before and during the crisis. It seems that their ability to translate DC into higher tech
7 performance is least successful in the period before and during crises, but this is alleviated in
8 the post crisis period, where they show similar ability as compared to other EMNEs.
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16 Agility as a concept is evident during the periods of deep uncertainty, such as the global
17 financial crisis. Our evidence isolates this in phase 2 and therefore tests hypothesis 2b.
18 According to our results, we find that the EMNEs from BRICS countries are the ones which
19 show greater agility in respect to their operations in France, whereas EMNEs from Central
20 and Eastern are more agile in their operations in Germany. The reason for this is confirmed
21 by the extant literature which suggests that EMNEs from BRICS are more experienced in
22 their international operations. However, in the face of higher uncertainty in the UK the
23 EMNEs from the commonwealth show less agility which highlights perhaps the limited
24 entrepreneurial management capabilities of these EMNEs. This is despite the fact that
25 EMNEs from the Commonwealth have strong historical and cultural proximity to the UK.
26 One of the reasons for their limited agility could be that the EMNEs from the Commonwealth
27 are very much heterogeneous in nature and background, which subsequently mitigates the
28 positive impact that actually comes from a few leading countries, such as India and Nigeria.
29 Similarly, the results for the French colonies shows a negative coefficient throughout the
30 three phases. Again, this seems to suggest that historical and cultural proximity are not
31 sufficient reasons that can substitute for greater levels of agility. In other words, historical
32 and cultural proximity may reduce an EMNEs liability of foreignness which the literature has
33 unambiguously shown, but our study suggests that this does not necessarily correlate with the
34 ability and agility to translate DC into greater technology performance.
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[Insert Table 2, 3 and 4]

5. Conclusions

This paper contributes to the EMNE literature by exploring for the first time the relationship between DC, agility and technological firm performance and observing variation in technological performance of EMNEs over three distinct time phases. We conceptualise technological performance in our paper as an output of a firm's capacity in integrating knowledge and processes. As our study is exploratory in nature, we provide a number of valuable insights through our empirical study for EMNEs that operate in advanced countries.

Our first finding is that DC impacts positively on technological firm performance in EMNEs that operate in Europe, with evidence from UK, Germany and France. The implications of this result for the senior managers of EMNEs is, the strategic decision to internationalise to advanced developed economies should be coupled with deliberate learning investments at the organizational level in order attain and maintain technological performance.

Further, our study was deliberately designed longitudinally to capture the relationship between DC and tech performance over three different and important phases in order better capture and isolate the extent of agility demonstrated by EMNEs. This paper further contributes by looking at EMNEs tech performance and ability to be agile in three different European countries over the same period of time. Our results show that not all EMNEs are similar in their capacity to be agile at different phases and different countries. This could be due to the country background, historical and cultural proximity, as well as experience that the EMNEs had in the respective European countries.

The implications for EMNE managers is that they cannot purely rely on historical and cultural connections to the host country to be successful in tech performance, particularly in

1
2
3 different phases of uncertainty. Instead, our findings suggest that the reliance on and
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5 investment in DC would be much more fruitful to gain better tech performance.
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8 [Insert Figure 1 here]
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11 Theoretically, our paper also contributes to the ongoing debate in the literature. We
12
13 observe that the literature on DC has two broad schools of thought. The first school of
14
15 thought has emerged from the works of Nelson and Winter's (1982) *The Evolutionary Theory*
16
17 *of Economic Change*, which was adopted by Zollo and Winter (2002) to argue that DC
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19 develops from repetitive routines. Routines are facilitated by deliberate learning investments
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21 and firms that make such learning investments, perform better.
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25 The second school of thought builds on the RBT and argues that DC results from a
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27 firm's capacity to reconfigure organisational resources, thus further improving existing
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29 resource configuration (Teece et al., 1997; Eisenhardt and Martin, 2000). Teece et al. (2016)
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31 further builds on this perspective and argues that organisational agility is a DC in itself,
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33 which firms adopt in the times of deep uncertainties.
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37 In our research, we note that in the pre-crisis period, the greater technological
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39 performance of EMNEs across different advanced European countries could be explained as
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41 a result of adaption of deliberate learning investments by these firms. However, in the crisis
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43 period we observe that DC are predominantly about taking agile decisions to adapt to
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45 changing environments. Thus, in our study we observe the two perspective on DC in action.
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47 In stable environments (pre-crisis) the routine perspective takes precedent whereas in in a
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49 crisis environment the agility perspective is more prominent. We would argue that the two
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51 perspective are to a certain extent complimentary and not exclusive (See Figure 1). Future
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53 research should investigate and shed more light on the complimentary nature of the two
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55 perspectives on DC
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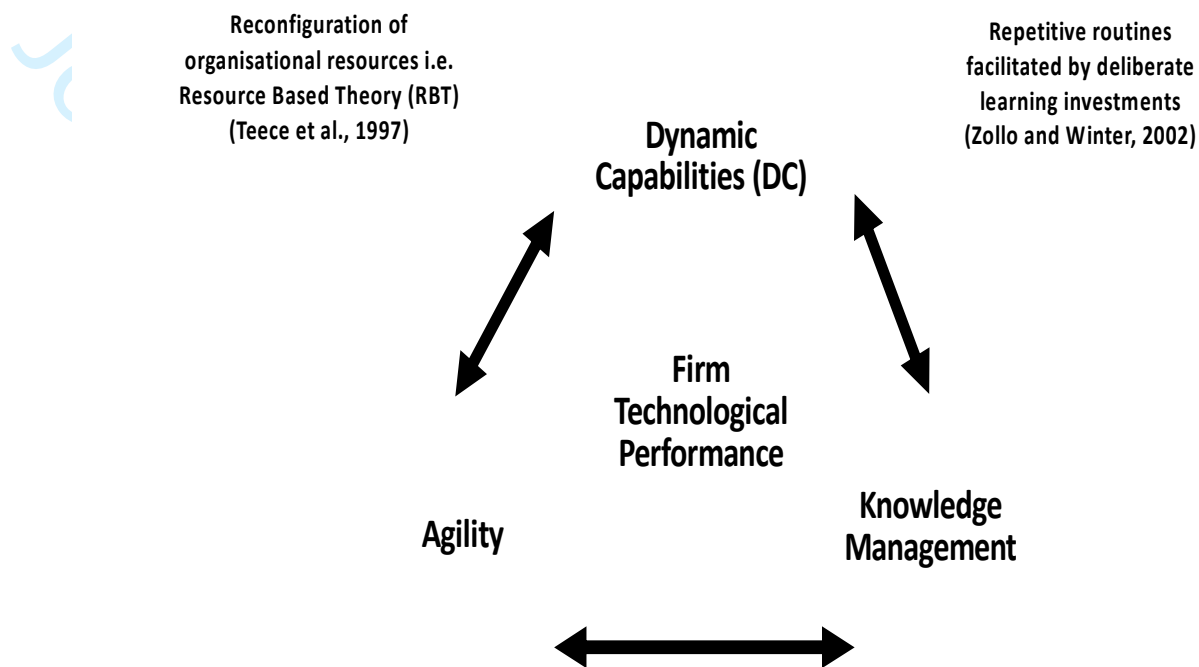


Figure 1: Theoretical model developed based on authors proposed contribution

**Table 1 Distribution of EMNEs in Germany, France and the UK
(2005-2016)**

	Germany	France	UK
BRICS	336	351	353
MINT	48	72	48
Eastern and Central Europe	180	62	61
French colonies	9	251	27
Commonwealth	197	226	667
Rest of emerging markets	349	378	513
Total Number of Firms	1,119	1,340	1,669

Source: Authors' calculations from the ORBIS dataset.

Table 2: Impact of Dynamic Capabilities on Knowledge Management in Germany

	Before Crisis (2005-2007)			During Crisis (2008-2012)			Post Crisis (2013-2016)		
	BRICS	MINT	Eastern Europe	BRICS	MINT	Eastern Europe	BRICS	MINT	Eastern Europe
Dependent variable: log TFP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dynamic Capabilities	0.0548*** (0.00677)	0.0504*** (0.00547)	0.0395*** (0.00616)	0.0470*** (0.00510)	0.0449*** (0.00411)	0.0336*** (0.00459)	0.0329*** (0.00521)	0.0323*** (0.00416)	0.0274*** (0.00462)
Group	0.117* (0.0650)	0.692** (0.327)	-0.211*** (0.0680)	0.0764 (0.0484)	0.702*** (0.272)	-0.222*** (0.0518)	-0.00812 (0.0481)	0.213 (0.377)	-0.0890* (0.0526)
Group*Dynamic Capabilities	-0.0187 (0.0115)	-0.148*** (0.0516)	0.0397*** (0.0137)	-0.0106 (0.00862)	-0.139*** (0.0437)	0.0495*** (0.0105)	-0.00149 (0.00868)	-0.0137 (0.0659)	0.0268** (0.0108)
Constant	4.356*** (0.0361)	4.384*** (0.0301)	4.448*** (0.0350)	4.380*** (0.0271)	4.398*** (0.0225)	4.458*** (0.0259)	4.479*** (0.0272)	4.476*** (0.0225)	4.497*** (0.0257)
Observations	2,796	2,796	2,796	4,660	4,660	4,660	3,728	3,728	3,728
F-statistic	27.77	29.58	30.20	38.75	41.49	45.96	20.18	20.26	22.16
Prob > F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared	0.029	0.031	0.031	0.024	0.026	0.029	0.016	0.016	0.018

Note: ***, **, * denote significance at the 1%, 5% and 10% level, respectively. Robust t-statistics are in parentheses.

Table 3: Impact of Dynamic Capabilities on Knowledge Management in France

	Before Crisis (2005-2007)			During Crisis (2008-2012)			Post Crisis (2013-2016)		
	BRICS	MINT	French Colonies	BRICS	MINT	French Colonies	BRICS	MINT	French Colonies
Dependent variable: log TFP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log Intangible assets	0.0398*** (0.00669)	0.0468*** (0.00564)	0.0563*** (0.00612)	0.0308*** (0.00503)	0.0390*** (0.00418)	0.0464*** (0.00452)	0.0265*** (0.00539)	0.0369*** (0.00441)	0.0407*** (0.00473)
Region	-0.107* (0.0561)	-0.011 (0.445)	-0.132** (0.0616)	-0.106** (0.0415)	0.234 (0.347)	-0.169*** (0.0474)	-0.111** (0.0436)	0.108 (0.309)	-0.261*** (0.0521)
Region*Intangible assets	0.0266** (0.0124)	0.0517 (0.0592)	-0.0766*** (0.0145)	0.0287*** (0.00904)	0.0336 (0.0470)	-0.0609*** (0.0110)	0.0336*** (0.00947)	0.0474 (0.0481)	-0.0370*** (0.0119)
Constant	4.229*** (0.0323)	4.196*** (0.0265)	4.241*** (0.0297)	4.265*** (0.0247)	4.228*** (0.0199)	4.280*** (0.0222)	4.277*** (0.0268)	4.234*** (0.0212)	4.303*** (0.0234)
Observations	3,570	3,570	3,570	5,950	5,950	5,950	4,760	4,760	4,760
F-statistic	25.85	25.08	37.03	34.15	32.84	48.65	28.56	25.56	39.97
Prob > F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: ***, **, * denote significance at the 1%, 5% and 10% level, respectively. Robust t-statistics are in parentheses.

Table 4: Impact of Dynamic Capabilities on Knowledge Management in the UK

	Before Crisis (2005-2007)			During Crisis (2008-2012)			Post Crisis (2013-2016)		
	BRICS	MINT	Common wealth	BRICS	MINT	Common wealth	BRICS	MINT	Common wealth
Dependent variable: log TFP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log Intangible assets	0.0541*** (0.00485)	0.0591*** (0.00410)	0.0713*** (0.00594)	0.0555*** (0.00363)	0.0555*** (0.00306)	0.0664*** (0.00446)	0.0621*** (0.00365)	0.0616*** (0.00307)	0.0709*** (0.00450)
Region	-0.00162 (0.0687)	0.694 (0.885)	0.0458 (0.0607)	0.140*** (0.0507)	0.231 (0.621)	0.0343 (0.0452)	0.151*** (0.0494)	0.208 (0.409)	0.0381 (0.0446)
Region*Intangible assets	0.0145 (0.00904)	-0.0638 (0.126)	-0.022*** (0.00818)	-0.00214 (0.00673)	-0.0183 (0.0903)	-0.012*** (0.00612)	-0.00328 (0.00668)	-0.0319 (0.0659)	-0.017*** (0.00614)
Constant	3.643*** (0.0355)	3.636*** (0.0304)	3.608*** (0.0434)	3.636*** (0.0265)	3.669*** (0.0227)	3.646*** (0.0324)	3.680*** (0.0263)	3.718*** (0.0223)	3.694*** (0.0321)
Observations	3,981	3,981	3,981	6,635	6,635	6,635	5,308	5,308	5,308
F-statistic	74.36	69.73	77.92	21.52	9.70	22.19	46.76	34.52	42.04
Prob > F stat	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: ***, **, * denote significance at the 1%, 5% and 10% level, respectively. Robust t-statistics are in parentheses.

Appendix 1

Definitions of variables

Variable name	Description
Employees	Total number of full time employees of the company (personnel)
Sales	Total Operating Revenue (Net sales +Other operating revenue + Stock variations). These figures do not include VAT or excise taxes and similar obligatory payments. (Sales) is defined in the Balance Sheet account
Tangible Fixed Assets	All tangible fixed assets, such as building and machinery. The Tangible Fixed Assets are defined in the Balance Sheet account
Material costs	The amount invested in the production of goods and services. It is financial item of the Profit & Loss account
Log of TFP	Log of Total Factor Productivity as the residual of production functions
Intangible Fixed Assets	All intangible assets such as formation expenses, research expenses, goodwill, development expenses and all other expenses with a long term effect. The Intangible Fixed Assets is a financial label of the Balance Sheet account
BRICS	Dummy equals 1 if the EMNE has its ultimate country of ownership in one of the BRICS countries, otherwise zero.
MINT	Dummy equals 1 if the EMNE has its ultimate country of ownership in one of the MINT countries, otherwise zero.
Eastern and Central Europe	Dummy equals 1 if the EMNE has its ultimate country of ownership in one of the Eastern and Central European countries, otherwise zero.
French colonies	Dummy equals 1 if the EMNE has its ultimate country of ownership in one of the former French colonial countries, otherwise zero.
Commonwealth	Dummy equals 1 if the EMNE has its ultimate country of ownership in one of the Commonwealth countries, otherwise zero.