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Home Region Focus and Technical Efficiency of Multinational Enterprises

The Moderating Role of Regional Integration

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Abstract:

- The transaction costs economics (TCE) perspective on regionalization suggests that multinational enterprises (MNEs) would experience advantages from regionalization and, hence, greater technical efficiency from a high home region focus (HRF). We extend this TCE perspective by proposing that whether a regional (i.e., higher HRF) or global (i.e., lower HRF) strategy leads to greater technical efficiency depends on the degree of regional integration (i.e., economic and policy) of the MNEs' home regions.
- This is the first study in the regional/global strategies literature to analyze the effects of HRF and regional integration (economic and policy) on firms' technical efficiency performance. We suggest that advantages from regionalization arise when firms align their HRF strategy with the degree of regional integration; disadvantages from regionalization can arise when the two are misaligned.
- Our empirical analysis on a sample of 645 manufacturing Triad MNEs during 2000–2006 provides overall support for our conceptual framework.

Keywords: Transaction cost economics · Technical efficiency · Home region focus · Regional economic integration · Regional policy integration · Triad multinationals

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Introduction

Recent advances in international business research suggest that most multinational enterprises (MNEs) tend to be regional rather than global in their scope, as they extract most of their sales from their home regions, i.e., have a high home-region focus (HRF) (e.g., Delios and Beamish 2005; Elango 2004; Hejazi 2007; Li 2005; Rugman and Verbeke 2004, 2005, 2008). This growing literature supports a Transaction Cost Economics (TCE) perspective on regionalization, since the typically lower transaction costs within the home region allow MNEs to still benefit from foreign market penetration but without the higher costs associated with a global expansion into less familiar and more geographically distant markets (Ghemawat 2003; Rugman and Verbeke 2004, 2005, 2008). Thus, the TCE perspective on regionalization suggests that MNEs with a high HRF should enjoy efficiency gains in their operations due to the lower costs of targeting their home regions (Hejazi 2007; Li 2005; Qian et al. 2010; Rangan and Sengul 2009; Rugman and Verbeke 2004, 2005, 2008).

However, efficiency gains from a high HRF have not been explicitly tested in prior regional/global strategies studies. Scholars have theorized about the efficiency effect of HRF on corporate performance (e.g., Delios and Beamish 2005; Rugman and Verbeke 2004, 2005, 2008), but the empirical tests have focused mostly on financial performance measures like return on assets (ROA) or return on sales (ROS) (e.g., Banalieva and Santoro 2009; Elango 2004; Lee and Marvel 2009; Li 2005; Qian et al. 2010). While these standard financial performance measures are important, it is interesting and useful to explicitly analyze the effect of HRF on firms' technical efficiency. Technical efficiency shows how far a firm is from its most efficient production frontier; i.e., what is the firm's capacity utilization (Li 2008; Miller and Parkhe 2002). Unlike financial performance metrics, technical efficiency allows monitoring whether firms "err by producing at the wrong level or mix of inputs," which affects their efficiency and, ultimately their competitive advantage and survival (Miller and Parkhe 2002, p. 56). Additionally, technical efficiency, as a microeconomics performance metric, accounts for product mix and input prices and "does not penalize firms for operating in a high-cost labor market" (Miller and Parkhe 2002, p. 56). Hence, using technical efficiency as the dependent variable represents a useful and appropriate, yet under-explored way to directly test the TCE theoretical predictions about firms' possible efficiency gains from a HRF strategy. Our study attempts to fill this important gap.

While the TCE arguments for efficiency gains from high HRF are compelling, we wonder whether a higher HRF is *always* associated with greater technical efficiency. We suggest that an important way to extend the TCE perspective on regionalization is by identifying contextual factors that may affect firms' HRF-technical efficiency relationship. One such under-explored contextual factor is regional integration within an MNE's home region. Specifically, we argue that efficiency gains from a regional (high HRF) or a global (low HRF) strategy depend on regional integration, expressed in terms of economic and policy integration.

Studying the modifying role of regional integration is important because the home regions of many MNEs have experienced a proliferation of regional trade agreements (RTAs). RTAs are "intergovernmental treaties through which signatory countries agree

to more advantageous conditions in the conduct of their mutual trade and investment relationships than those conditions applied to other, non-signatory partners" (Cuervo-Cazurra and Un 2007, p. 227). The number of RTAs in force continued increasing from 69 in 1998, to 176 in 2002, and 218 in 2010 (WTO 2003, 2010). Since RTAs vary in their economic and policy integration (Dunning and Robson 1987; Robson 1993), we focus on these two dimensions as modifying factors to the HRF-technical efficiency relationship. Regional economic integration increases the trade interdependence of the RTA countries and regional policy integration increases the extent of policy harmonization among the RTA members. Some RTAs are more economically interdependent and coordinated so that their intra-RTA trade is larger relative to their trade with the rest of the world. Likewise, some RTAs enjoy higher policy integration, as the RTA members have adopted similar rules and regulations that facilitate MNEs operating within the RTA. We, therefore, suggest that both economic and policy integration have implications for MNEs' distance from their ideal production frontier in response to their HRF strategy.

At the macro-level, regional integration has been shown to be beneficial for signatory countries (Cuervo-Cazurra and Un 2007; Fratianni and Oh 2009). However, its effect on firms' technical efficiency has not been analyzed to date in the regional/global strategies literature. In fact, Brahm (1995, p. 87) has lamented that, "[s]trategic management scholars have…traditionally stayed away from research topics that require expertise (and interest) in trade theory." Similarly, Dunning and Robson (1987) have noted that "there have been few attempts" to incorporate the findings of the macro-level regional integration literature into the firm-level MNE literature. Thus, we aim to understand: How does firms' HRF affect their technical efficiency, and are there regional institutional conditions that can modify the HRF-technical efficiency relationship? It is useful to explore these research questions since they provide a new contingency perspective on the scope of regional strategy. If regionalization is advantageous to firms, then a higher HRF can be an optimal, productivity-maximizing strategy that MNEs should follow. However, if HRF efficiency gains exist only under certain conditions, then it is important to identify these conditions for optimal theoretical and managerial recommendations.

Conceptual Background

The Importance of Technical Efficiency

We begin our conceptual background by reviewing the notion of technical efficiency, which is at the heart of our study. Technical efficiency was originally defined by Koopmans (1951) to mean that a producer cannot produce more output without using more of some of his inputs; i.e., the producer is technically efficient in the sense that he has maximized his production function and is producing the maximum level of output (determined by an "ideal" production frontier) given the level of inputs (Li 2008). The concept illustrates the ability of the firm to avoid wasting away resources (Fried et al. 2008). Firms that are "on the frontier" are technically efficient and firms that fall short of the frontier are technically inefficient as they are using more than the minimum amount of inputs required to produce the same level of output. Thus, technical efficiency measures the gap that

exists between the actual and potential production levels, and it is this particular distance from the frontier that our theoretical framework aims to explain.

The notion of technical efficiency is closely related to TCE theory (Li 2008). TCE suggests that "economizing is central to economic activity" (Williamson 1985, p. xii). In order for firms to maximize their production functions and minimize their technical inefficiency, they need to economize on their transaction costs. For example, TCE predicts that "home regions confer efficiency" (Rugman and Verbeke 2005, p. 13) as MNEs attempt to economize on transaction costs from "globalization hazards (i.e., the inefficiencies that would result from overstretching in geographic diversification" (e.g., Rugman and Verbeke 2005, p. 10). Moreover, when MNEs operate in geographically proximate environments, "joint decision making and cross-border coordination should be more efficient" (Rangan and Sengul 2009, p. 232). To this point, Qian et al. (2010) suggest a high HRF is associated with greater efficiency due to the higher likelihood of having greater managerial control on the logistical costs of cross-border strategies. While these important prior studies have theorized that efficiency gains are the main outcome from a high HRF, they have not explicitly tested these theoretical predictions.

Since TCE assumes economic agents are rational, but only boundedly so due to a variety of uncertainty and transaction costs, it is also consistent with the general objective of firms to produce more with less in order to economize on production, coordination, and adjustment costs. Firms that are technically inefficient typically have limited managerial processing capacity—a type of boundedly rational behavior emphasizing "the scarcity of mind" (Verbeke and Greidanus 2009, p. 1482). Thus, the notion of technical efficiency is consistent with TCE's behavioral assumption that agents are boundedly rational—if firms were perfectly rational, they would be producing at the most efficient production frontier all the time and would not suffer from technical inefficiencies. Bounded rationality prevents firms from making optimal decisions all the time, leading to "losses in efficiency" (Verbeke and Greidanus 2009, p. 1489). In this study, we suggest that firm-specific characteristics such as HRF and regional institutional characteristics such as the degree of economic and policy integration represent important factors that explain the technical inefficiency gap from the "best production frontier."

Synthesis of Prior Related Research

We reviewed prior studies that have analyzed the effect of HRF on firm performance in Table 1 in order to lay the foundation for our subsequent theoretical framework. Table 1 shows most of these prior studies focused on developed country samples (e.g., Elango 2004; Li 2005; Qian et al. 2010), finding inconclusive results: some studies found that regional strategy enhances firms' financial performance (e.g., Lee and Marvel 2009; Li 2005; Qian et al. 2010) while others found that a global orientation is more beneficial (e.g., Banalieva and Santoro 2009; Elango 2004). These studies focused on analyzing standard financial performance metrics like ROA (Banalieva and Santoro 2009; Lee and Marvel 2009; Qian et al. 2010), ROS (Li 2005), or gross profit margin (Elango 2004).

While such metrics remain as some of the most widely used performance metrics in the international business literature, there has been a noted lack of studies examining a firm's technical efficiency. Analyzing a firm's gap from the most efficient production

Table 1: Synthesis of representative studies relating HRF to performance

Study	Sample	Performance	HRF	Interaction effect with	Main finding
Qian et al. (2010)	123 U.S. MNEs, 1999–2005	ROA	Intra-regional (IA) entropy; Inter-regional (IE) entropy	–	IA entropy increases performance; IE entropy inverted-U shape with performance
Banalieva and Santoro (2009)	701 EM MNEs; 2000–2006	Relative ROA	Local orientation; intra-regional orientation	Inter-regional orientation	A combination of Local and global orientations enhance performance; regional orientation reduces performance
Lee and Marvel (2009)	2676 Korean SMEs in 2002	ROA	Value of home regional sales	R&D Intensity	HRF enhances cost leadership & differentiation performance, but not "stuck in the middle" performance
Li (2005)	574 U.S. service MNEs, 1997–2001	ROS	Rest of home region sales/ foreign sales	Foreign sales/total sales	High HRF positively moderates the multinationality-performance S-curve
Elango (2004)	130 world MNEs, 1999/2000	Gross profit Margin	Regional sales/ total sales; global sales/ total sales	Product diversification	Global operations have higher gross profit margins than regional operations

EM MNEs stand for emerging market multinational enterprises; SMEs stands for small & medium sized enterprises

frontier entails a comprehensive analysis of its mix and usage of capital and labor inputs in its production function, something which the standard financial performance metrics do not account for. Thus, technical efficiency captures the full economic profit for the firm created by management (Shil 2009). Yet, we have limited knowledge on whether HRF leads to greater technical efficiency, and, if so, under what conditions, despite technical efficiency being considered a "fundamental issue for MNEs" (Li 2008, p. 40).

While the studies synthesized in Table 1 show insufficient emphasis on analyzing the effects of regional economic and policy integration on the HRF-efficiency relationship, a related literature has devoted ample attention to the topic of how regional integration affects MNEs' practices. Dunning and Robson (1987) provide a detailed synthesis of the early stages of that literature. We reviewed these studies in Table 2. Table 2 shows that an impressive body of work has been published on this topic of growing research importance. For example, previous research has analyzed how regional integration affects FDI flows (e.g., Chen 2009; Grosse 1983; Mold 2003), R&D investment (Cuervo-Cazurra and Un 2007), or HR practices (Walsh 1996). While these studies added important dimensions to this small but growing literature, more emphasis is needed on analyzing the mod-

Table 2: Synthesis of representative studies on effects of regional integration on MNEs

Study	Sample	Regional integration	Dependent variable	Main findings
Chen (2009)	U.S. affiliates in 40 countries, 1986–1999	Preferential trade agreements	Affiliate sales; Exports to third countries; FDI inflows	Countries integrated into larger RTAs experience greater increase in foreign direct investment
Cuervo-Cazurra and Un (2007)	1,441 Spanish firms, 1991–1994	Entry into RTA	R&D investment	After RTA entry, product markets induce firms to invest more in R&D
Mold (2003)	U.S. firms, 1978–1995	Announcement of the single market program	Foreign direct investment inflows	Demand-side variables (size and GDP growth) are most important determinants of FDI inflows
Walsh (1996)	13 British MNEs, 1993	European integration	Human resource practices	British MNEs are not polycentric but eurocentric in their HR practices
Grosse (1983)	28 MNEs, 1978–1981	Foreign Investment code	Foreign direct investment	Strict ownership limits deter investors from code-adopting countries
Tironi (1982)	–	Economic integration	–	For a given foreign profit diversion effect, the foreign profit creation effect is smaller
Kindleberger (1966)	–	Customs unions/ common markets	–	Economic integration cannot be achieved by customs unions alone but requires factor movements as well

erating effect of regional integration on the geographic scope-performance relationship for MNEs. We aim to fill these gaps in the present study.

Theory and Hypotheses Development

Figure 1 illustrates our conceptual framework and hypotheses. We begin our theory development by first examining the baseline effect of HRF on firms' technical efficiency, followed by analyzing the modifying effects of regional economic and policy integration.

Home Region Focus and Technical Efficiency

As our conceptual background highlighted, the effect of firms' HRF on technical efficiency has not been empirically examined to date. The TCE perspective of regionalization has emphasized that since transaction costs outside the home region exceed those within the home region (e.g., Elango 2004; Ghemawat 2003; Rugman and Verbeke 2004, 2005,

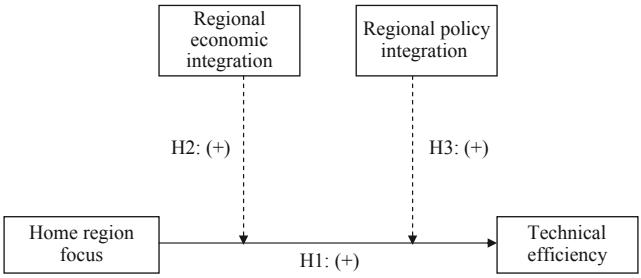

Fig. 1: Relationship of home region focus, regional integration and technical efficiency

2008), MNEs should benefit by limiting their geographic scope to their home region. Due to the proximity and familiarity with firms' home region partners, suppliers, consumers, and institutions, Rugman and Verbeke (2005) note that, "it can be efficient for an MNE to expand within its home region; it does not need to go global." Similarly, Elango (2004, p. 433) argues for a positive relationship between firms' HRF and efficiency due to the lower regional liability of foreignness.

Efficiency-seeking is a major motivation for MNEs' internationalization (Dunning 1988, Rugman and Verbeke 2004) and by focusing more on its home region, an MNE can expect reduced transaction costs due to the lower intra-regional liability of foreignness (Rugman and Verbeke 2004, 2008). Rindfleisch and Heide (1997) summarize the source and types of transaction costs and separate transaction costs into direct and opportunity costs. Direct costs come from contracting, safeguarding, screening, negotiation, and coordination. Opportunity costs stem from failure to invest in productive assets, failure to adapt, and failure in selecting appropriate partners and consequent productivity losses due to adjustment efforts. When firms target their home region, they can expect a decrease in both the direct and opportunity costs. Geographic proximity makes it easier to screen, negotiate, and coordinate within the home region while the physical and psychological closeness reduces opportunism and contracting hazards, and consequently safeguarding costs. Likewise, similarity reduces the likelihood of mismatch and adjustment and adaptation costs.

Thus, as MNEs increase their HRF, they can expect more technical efficiency gains from both supply-side and demand-side factors. On the supply side, pursuing a high HRF strategy may lead to cost advantages by improved scheduling, coordination, and control both within the firm and its suppliers. From the demand side, as MNEs target a more homogeneous market within their home regions, they can achieve savings by offering more standardized products, conducting more standardized marketing campaign and, hence, save on adaptation and adjustment costs. Firms can also increase their technical efficiency from appealing to similar markets within the home region and from frequent interactions of common buyers and suppliers within the home region (Alcacer and Chung 2007). Greater proximity increases the benefits from regionalization advantages as face-to-face interactions are less challenging (Rosenthal and Strange 2003).

Conversely, greater geographic distance increases the search and deliberation costs for MNEs (Rangan 2000). As MNEs penetrate markets that are farther away from their home markets, they grow uncertain about the foreign economic processes and search costs increase as they seek to identify potential exchange partners (Rangan 2000). As glo-

bal countries are different and businesses incur additional information-gathering costs in venturing into their less-familiar markets, global liability of foreignness increases (Rugman and Verbeke 2004; Zaheer 1995). Thus, search costs become more problematic with the greater dispersion of the potential exchange partners and markets (Rangan 2000). Conversely, countries within the home region are much closer geographically and institutionally (Ghemawat 2003; Rugman and Verbeke 2004). As a result, deliberation costs are much lower for home region neighbors due to the firms' greater familiarity with the economic processes within the home region (Rangan 2000). These arguments suggest that, keeping regional economic and policy integration constant, the baseline relationship between HRF and technical efficiency is such that:

Hypothesis 1: A greater home region focus would reduce the gap from the best production frontier and, hence, would increase firms' technical efficiency.

The Moderating Role of Regional Economic Integration

We next suggest that this baseline relationship can be modified by the level of regional economic integration. In regions with high regional economic integration, the countries within the RTA tend to have high economic interdependence characterized by complementary factor endowments (Porter 1990). This, in turn, expands the range of inputs available to MNEs within the RTA and allows such producers to match more efficiently and effectively their inputs to newly-available technologies (Ethier 1982). Better access to regional suppliers may also lead to firm-level efficiency gains (Cuervo-Cazurra and Un 2007), stimulating firms to expand their output (Helpman and Krugman 1989). This effect would be even stronger for firms with high HRF, as it allows them to improve their intra-regional scale efficiency. Blomstrom and Kokko (1997) support this argument by noting that regional integration leads to efficiency gains and growth.

As a region's intra-RTA trade intensifies, the RTA trading partners' costs decline, which enable high HRF firms to lower their cost structure through economies of scale (Andriamananjara 1999; Wonnacott 1996). These economies of scale and the ability for member firms to be lower cost producers creates larger and more competitive markets within the RTA that enable the continued minimization of intra-regional tariffs and increased investments by member countries due to preferential access to RTA-wide markets (Wonnacott 1996). Thus, firms that deepen their home regional market penetration should be best positioned to take advantage of such increased regional economic integration.

In a similar vein, greater intra-RTA trade results in frequent interactions among the RTA members, which lead to stronger economic ties among the RTA members (Putnam et al. 1993). Indeed, "trust and shared experiences are much more likely among individuals who reside near each other…geographic proximity is clearly associated with better estimates of trust, understanding and confidence" (Lester and Cannella 2006, p. 763). Similarly, Romanelli and Khessina (2005, p. 347) add that, "[w]ithin regional boundaries, frequent interaction promotes the exchange of information of situations and events that participants in the exchange commonly experience." Thus, greater trade within the geographically-proximate RTA member countries allows RTA-based MNE managers following a high HRF strategy to interact more frequently with their RTA counterparts

and achieve a shared understanding of "life and work within a region" (Romanelli and Khessina 2005, p. 347). Such frequent interactions ultimately lead to greater cooperation and lower bounded rationality costs (Lester and Cannella 2006; Romanelli and Khessina 2005; Rugman and Verbeke 2005). Hence, firms with a high HRF and based in RTAs with a high regional economic integration are better positioned to appropriate these efficiency gains and should be more technically efficient than their counterparts based in RTAs with lower degree of trade integration.

Conversely, MNEs based in RTAs with a lower regional economic integration would be less able to derive advantages from regionalization. First, a lower degree of intra-RTA trade may reflect a lack of factor complementarity and, hence, lower interdependence among the economies in the region. In such cases, firms are less likely to rationalize their value chain activities, especially if they focus heavily on their home region. From a TCE perspective, this would lead to a higher cost structure for firms with higher HRF.

Second, a lower degree of regional trade indicates fewer opportunities for frequent interaction among the firms in the region, leading to lower degree of economic ties among home regional countries and firms. This can, in turn, increase the transaction costs from boundedly rational behavior. A combination of low regional economic integration and high HRF can lead to a mismatch between environment and strategy, which may make technology transfer costlier, especially in the case of process technologies that are often an instrumental factor in reducing a firm's cost structure and increasing their technical efficiency (Romanelli and Khessina 2005). This can translate into greater regional competition, which can stymie an MNE's cost reduction strategies by inhibiting market share growth needed for achieving greater economies of scale.

The above arguments suggest that a strategic fit (Venkatraman and Prescott 1990) between HRF and regional economic integration needs to be achieved before firms can enjoy superior technical efficiency. MNEs that are based in less economically integrated RTAs and that are focused on penetrating global rather than regional markets should be best positioned to take advantage of the lower degree of economic integration within their home regions. Thus, regional economic integration is expected to have the following modifying effect:

Hypothesis 2: Higher regional economic integration would further amplify the positive effect of higher HRF on firms' technical efficiency.

The Moderating Role of Regional Policy Integration

Lastly, we suggest that the baseline HRF-efficiency relationship can also be modified by the level of regional policy integration. As countries increasingly enter into RTAs for increased regional economic trade and cooperation, they also enter into different levels of policy integration within the RTA. RTAs in the early stages of integration (e.g., APEC), are still in pre-free trade agreement (FTA) status. Others have established FTAs (e.g. NAFTA), which results in eliminating trade barriers within the region. RTAs with higher levels of policy integration, such as the European Union (EU), have harmonized their member countries' policies in key areas such as product standards, market regulations, trade, fiscal, and monetary policies. For example, if a region moves a step up in level of

policy integration from a free trade area to a customs union (CU), then the RTA enjoys "[t]he elimination of the need for rules of origin" (Holden 2003), since customs union members have a common external tariff for non-members. As a result, "[a] CU would result in significant administrative cost savings and efficiency gains" (Holden 2003), for the firms in the member countries, which coupled with a high HRF of the MNEs, should increase firms' technical efficiency.

Moreover, higher levels of policy integration ensure regulations are developed with a goal of appealing to as broad a set of RTA constituencies as possible in order to facilitate intra-RTA trade (Krueger 1993). As a result, MNEs can realize significant savings in adaptation and adjustment costs in their product offerings and distribution strategies, and, thus, improve the firms' overall competitive positioning. These adaptations can also be the impetus for firms to centralize their manufacturing facilities, helping them achieve scale and scope economies, thus resulting in reduced production and transaction costs and increased technical efficiency.

Additionally, higher levels of policy integration also implies that future policies or modifications to existing policies are created with an eye toward having less bureaucratic hurdles and more ease of use that together reduce transaction costs and increase efficiency (Deng 1998). Consistent with our theory development for the modifying effect of regional economic integration, we, hence, suggest that a strategic fit (Venkatraman and Prescott 1990) between HRF and regional policy integration is useful for high HRF firms to minimize their gap from the most efficient production frontier and increase their technical efficiency.

Conversely, in less policy-integrated RTAs, member states often retain more veto power, and enforcement mechanisms are not clearly defined, which leads to greater difficulty in resolving disputes and securing future agreements among the members (Anson et al. 2005). Such a lower degree of policy harmonization within the RTA member countries can lead to greater uncertainty and bounded rationality that can increase perceived risks and costs of doing business within the RTA, resulting in higher transaction costs, especially for firms pursing a high HRF strategy.

The disadvantages of less harmonized policies can be further illustrated in the case of rules of origin (regulations that ensure the goods sold within a FTA truly originate within the FTA and are, thus, eligible for duty-free treatment) (Krueger 1993). Maintaining divergent rules of origin raises the administrative and bookkeeping costs for the FTA members, as it requires extensive documentation by all FTA members and enforcement at borders, and may lead to internal disputes over rules of origin interpretation (Holden 2003). For instance, Anson et al. (2005) estimate that in NAFTA, the administrative costs from rules of origin amount to 47% of the preference margin. Thus, MNEs that focus on expanding within their home regions while also based in less policy coordinated RTAs would suffer disadvantages from regionalization due to the misalignment between firm strategy and regional institutional context.

Furthermore, divergent rules of origin increase the production costs for the FTA-based firms, as they impose various technical criteria for FTA members (Anson et al. 2005) such that, rules of origin encourage the use of intra-FTA inputs even if they are more expensive (ADB 2002; Krueger 1993). This increases the average cost of production of the intermediate goods of the RTA-based producers, especially if they are based in devel-

oped markets where manufacturing is generally more costly than in emerging markets. This, in turn, lowers the technical efficiency of the RTA-based MNEs, especially if their primary market focus is on their home region. If MNEs already have a high HRF, higher production, compliance, administrative, and book-keeping costs erode, even negate the efficiency gains from a high HRF predicted by TCE (Williamson 1985).

Some members of less integrated RTAs may also be unwilling to cooperate with other RTA members due to the real or perceived disparity in national incomes, national pride, and sometimes a lack of trust (Schiff and Winters 2003). For instance, the pre-FTA APEC is composed of 21 members including both developed markets like Australia, Canada, and Japan, and emerging markets like China, Chile, Indonesia, and Peru. It has been well-documented that APEC has a lack of leadership and an inability for its RTA members to often reach consensus. Deng (1998), e.g., notes that, "[d]espite a consensus regarding the need for APEC, its members disagree on almost all aspects concerning the pace, structure and content of regional cooperation. One anomalous phenomenon in Asia-Pacific regional cooperation is the lack of an unambiguous source of leadership." APEC has been documented to have a less institutionalized nature and lack strong regional cooperation among its members (Park and Lee 2009).

Such weak RTA policy coordination can put downward pressures on the MNEs' benefits from high HRF. Less policy coordinated RTAs provide less harmonized institutional contexts that make it harder to legitimize the member countries' MNEs (DiMaggio and Powell 1983). MNEs would have to adopt significant changes in their organizational processes, systems, and structures. Indeed, as the institutional environments grow more complex, so too must organizations by using more elaborate routines and coordinating mechanisms (Gedajlovic and Carney 2010). Such increased complexity may be undesirable for the MNE managers due to increased administrative and bureaucratic costs that have to be incurred to operate in less integrated RTAs. Thus, we propose:

Hypothesis 3: Higher regional policy integration would further amplify the positive effect of higher HRF on firms' technical efficiency.

Research Design

Data Sources and Coverage

We drew our sample of public manufacturing MNEs based in the Triad (U.S., Japan, Finland, France, Germany, Ireland, Netherlands, Sweden, and UK) from OSIRIS, a commercially available database provided by Bureau Van Djik that has been used in previous international strategy studies (Chakrabarti et al. 2007). Table 3 describes our sample.

Our focus on the Triad is consistent with prior research (e.g., Gomes and Ramaswamy 1999; Hitt et al. 1997; Elango 2004; Kotabe et al. 2002; Li 2005; Tallman and Li 1996). Additionally, our focus on manufacturing MNEs is consistent with our conceptual framework, which emphasizes the productive technical efficiency of firms as it tends to be a manufacturing-related concept (Li 2008), and with other research on firms' technical efficiency (e.g., Ayed-Mouelhi and Goaied 2003; Bhandari and Maiti 2007).

Table 3: Sample description by country and manufacturing sector

Description	Finland	France	Germany	Ireland	Japan	Netherlands	Sweden	UK	USA	Total
Beverages, food	6	3	–	3	30	6	–	7	6	*61*
Tobacco	–	–	–	–	–	–	2	–	–	*2*
Knitting mills	4	–	–	–	9	–	–	–	–	*13*
Textile & outerwear	–	–	–	–	3	–	–	–	7	*10*
Mobile homes	–	–	–	–	–	–	–	–	7	*7*
Furniture	–	–	–	–	–	–	3	–	13	*16*
Paper mills & bags	8	–	–	–	21	–	–	9	48	*86*
Printing & publishing	2	–	–	–	2	–	4	6	6	*20*
Chemicals	6	9	27	7	146	–	–	56	133	*384*
Petroleum refining	–	–	–	–	4	–	–	–	8	*12*
Tires, rubber, plastic	10	–	7	–	51	–	–	11	19	*98*
Glass, cement, pottery	–	6	3	–	29	–	–	14	28	*80*
Metals	–	7	4	–	41	2	–	11	47	*112*
Metal products	–	–	–	7	32	–	1	15	30	*85*
Computer & office equipment	16	6	30	–	216	6	12	41	195	*522*
Electronics	10	14	34	–	197	–	9	81	221	*566*
Transportation	–	9	13	–	121	–	–	29	86	*258*
Medical instruments	3	–	10	–	88	–	8	59	158	*326*
	65	*54*	*128*	*17*	*990*	*14*	*39*	*339*	*1,012*	*2,658*

We discarded financial firms due to their different reporting requirements and unique capital structures (Contractor et al. 2003; Fama and French 1992; La Porta et al. 2002; Ruigrok et al. 2007). We also discarded firms in which another firm held more than 25% ownership (as provided by OSIRIS) in order to ensure the firms were independent enough to determine their own strategy. Research has shown that widely-held firms are more likely to disclose more financial statement and segment information (Chau and Gray 2002; Depoers 2000; McKinnon and Dalimunthe 1993), which are key for operationali-

zing our primary independent variable: HRF. Our approach is consistent with prior research (Chen 2007).

After dropping a few outliers and missing observations and firms with just one year of observation in the data due to the needed panel data structure for estimation purposes, we obtained a sample of 645 MNEs for the years 2000–2006, representing 2,658 firm-year observations. Our use of a seven-year period builds on previous research, which has typically focused on similar time frames of 5 years (e.g., Li 2005) or 8 years (Ruigrok et al. 2007). We obtained the firm-specific financial data from OSIRIS & Mergent Online, the country-specific data from the World Bank, and the RTA trade data from the UN COMTRADE co-published with UNU-CRIS (UNU-CRIS 2008).

Statistical Analysis

Since our goal is to determine how HRF, in combination with regional economic and policy integration, affects how far the firm is from its most efficient production frontier, we used the time-varying stochastic production frontier analysis (e.g., Aigner et al. 1977; Li 2008; Miller and Parkhe 2002). The stochastic frontier analysis estimates an ideal, maximum production frontier that converts inputs (labor and capital) into output (value added) in the most efficient way (Aigner et al. 1977). The stochastic frontier method helps control for random unobserved heterogeneity across the firms by decomposing the estimated composite error term into a technical *in*efficiency component (Ui.t) and a random error component that cannot be influenced by producers (Vi.t). Following previous studies, we adopted the Cobb Douglas form of production technology (e.g., Dutta et al. 2005)[1]. In order to test our conceptual framework, we also rendered the production function to be more flexible by allowing for heterogeneity in the average technical inefficiency Ui.t (e.g., Battese and Coelli 1995; Heshmati and Kumbhakar 1994):

$$Y_{i.t} = f\,(X_{i.t} + V_{i.t} - U_{i.t}),\ where \tag{1}$$

$$U_{i.t} = f\,(X_{i.t} + error_{i.t}) \tag{2}$$

for firm i at time t, f(.) being the production technology, output Y, and explanatory variables X; $V_{i.t}$ is the independently and identically distributed random error; $U_{i.t}$ is the technical *in*efficiency term, with larger values of $U_{i.t}$ designating the firm is farther away from its most efficient production frontier (Aigner et al. 1977). Equation 1 is the standard production function and is jointly estimated with equation 2, which is the focus of our study, as the latter allows us to explicitly analyze the sources of technical inefficiency for the firms in our sample. Estimation follows the Battese and Coelli (1995) maximum likelihood method.

Measures

Technical Inefficiency

We captured the dependent variable from equation 2 with the technical inefficiency term, $U_{i.t}$ (Battese and Coelli 1995; Heshmati and Kumbhakar 1994). Due to the model estima-

tion technique, $U_{i.t}$ measures the degree of technical *in*efficiency, so the higher the $U_{i.t}$ the lower the degree of technical efficiency of the firm. In other words, higher values of the explanatory variables in the $lnX_{i.t}$ vector in equation 2 mean more technically *in*efficient firms.

Output

We captured the dependent variable from equation 1 as in prior research (e.g., Li 2008); i.e., we used the production-based net value added (VA)[2]: [(cost of goods sold + change in inventory)/cost of goods sold] * (net sales—cost of goods sold) + cost of employees (thousands of USD). The formula reflects the wealth a firm creates based on its own efforts and the efforts of its employees (Karpik and Belkaoui 1989).

Home Region Focus

We captured firms' HRF with the percentage ratio of rest of home region sales-to-foreign sales (e.g., Delios and Beamish 2005; Li 2005; Rugman and Verbeke 2008), adjusting for the home region's economic mass as suggested by prior research (e.g., Hejazi 2007): (rest of home region sales/foreign sales)/(rest of home region GDP/foreign GDP). Foreign GDP is the world's GDP excluding the home country's GDP to preserve consistency with our sales-level HRF measure. We pivot around the home region's GDP, as "a central prediction of international trade theory is that in a frictionless world, a country's share in world trade will be proportional to the country's share in world GDP" (Hejazi 2007, p. 25). Thus, when this ratio exceeds (is below) 1, it show that the firm is more (less) regional relative to its regional economic mass, so greater values of this ratio indicate that the firm is growing more regional than its home region's importance to the world economy.

Regional Economic Integration

For each country in our sample we considered the most advanced type of multilateral RTA it belongs to in a respective year because we were interested in the effect of the country's most advanced regional trade agreement on its firms' HRF-technical efficiency relationship. Thus, we assigned the U.S. to NAFTA, Japan to APEC, and the Western European countries to the EU[3]. Consistent with prior studies (e.g., Frankel et al. 1997; Iapadre 2006; Testas 1998), we measured *Regional Economic Integration* with the intra-regional trade intensity index, which is the ratio of intra-RTA trade share-to-the RTA's share in world's total trade. The measure helps determine whether the value of intra-RTA trade is greater or smaller than would be expected based on the RTA's importance in world trade. Values closer to zero indicate virtually no intra-RTA trade and values greater than 1 indicate that the intra-RTA trade is relatively more important than trade flows with the rest of the world. Iapadre (2006) notes that an increase in the trade intensity index indicates "an increase in trade integration, that is a reduction of trade resistances among the region's countries."

Regional Policy Integration

We followed Balassa (1961) and Nye (1968) and captured *Regional Policy Integration* by recognizing the gradual progression of policy-coordination with each level of RTA. We thus assigned 0 for APEC, 1 for NAFTA, and 2 for the EU. Thus, higher values of *Regional Policy Integration* indicate higher levels of regional policy integration among the countries of the firms' RTAs.

Interaction Terms

To test the moderator effects, we created two interactions: *HRF* × *Regional Economic Integration* and *HRF* × *Regional Policy Integration*.

Control Variables

We measured *Capital Input* with the ratio of capital expenditures-to-fixed assets and *Labor Input* with the ratio of cost of employees-to-number of employees (thousands of USD). Additionally, we controlled for the following: *R&D Intensity* (R&D expenses/total sales) and *Marketing Intensity* (selling, general, and administrative expenses/total sales) as higher firm-specific advantages may enhance firms' technical efficiency; *Internationalization* (foreign sales/total sales, Li 2005) as more internationalized firms may benefit from foreign scale and scope economies; *Industry Diversification* (the modified Berry-Herfindahl percentage index of industry diversification, Tallman and Li 1996) as more industry diversified firms may be less efficient due to over-use of their available resources; and *Firm Age* (ln of number of years since incorporation, Li 2008) as more experienced firms may be more technically efficient.

At the region-level, we added controls for: *Domestic Potential Size* (ln GDP/capita, World Bank) as higher domestic demand may enhance firms' efficiency; and *Regional Output* (output in manufacturing in annual rate of change, Bureau of Labor Statistics) as a higher regional productivity may enhance the firms' own productivity. Lastly, we controlled for *Time Trend* (Li 2008) to account for possible business cycle effects common to all firms in the same year. To control for possible industry and country effects, we adjusted the dependent variable in the production function, value added, by dividing it by the average value added per country and manufacturing sector instead of using multiple dummy variables for country and industries to preserve the degrees of freedom and avoid multicollinearity concerns. This value added adjustments reveal how firms performed relative to their country's industry and is in line with prior research, noting that firms tend to compare their strategies to those of their home country competitors in the same industry (e.g., Gimeno et al. 2005; Hannan and Freeman 1989; Haveman 1993), as these are most relevant for firms.

Results and Robustness Checks

Table 4 presents the descriptive statistics and correlations. On average, the Triad firms were quite international, with 42% internationalization. These firms were also more regio-

Table 4: Descriptive statistics and correlations

	Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1	Value added	−1.25	1.79	1.00											
2	Home regional focus	1.97	1.70	−0.03	1.00										
3	Cost of capital	0.06	0.98	*−0.07*	−0.02	1.00									
4	Cost of labor	10.14	22.87	−0.02	*−0.12*	0.03	1.00								
5	R&D intensity	0.05	0.06	*−0.13*	*−0.20*	0.01	0.03	1.00							
6	Marketing intensity	0.22	0.13	*−0.24*	*−0.15*	0.02	0.00	*0.51*	1.00						
7	Internationalization	0.42	0.24	*0.18*	*−0.26*	0.00	*0.34*	*0.21*	*0.05*	1.00					
8	Industry diversification	0.44	0.24	*0.34*	0.01	*−0.05*	*−0.11*	*−0.12*	*−0.10*	0.03	1.00				
9	Firm age	3.57	1.06	*0.24*	*0.10*	*−0.05*	*−0.06*	*−0.18*	*−0.16*	*−0.08*	*0.10*	1.00			
10	Domestic market potential	10.47	0.13	−0.03	−0.02	*0.06*	*−0.18*	*0.07*	*0.12*	*−0.11*	*0.09*	*−0.11*	1.00		
11	Regional policy integration	1.87	0.78	*0.04*	*−0.26*	*0.06*	*0.64*	*0.13*	0.03	*0.54*	−0.02	*−0.31*	*−0.12*	1.00	
12	Regional economic integration	1.80	0.36	*−0.05*	*−0.15*	*0.07*	*−0.18*	*0.14*	*0.16*	*0.11*	*0.11*	*−0.39*	*0.51*	*0.34*	1.00
13	Regional output (ann. change)	3.12	3.85	0.01	*0.15*	−0.02	*−0.12*	*−0.11*	*−0.09*	*−0.22*	−0.02	*0.23*	*−0.05*	*−0.44*	*−0.48*

Italic correlations are significant at 5%. Value added, domestic market potential, and firm age are shown in natural logs

nal than their home region's economic mass would suggest, as evidenced by the greater than 1 average HRF value of 1.97. The average *Regional Economic Integration* at 1.80 indicates that intra-RTA trade is on average greater than world trade for the firms' RTAs. Additionally, the low correlation between *Regional Economic Integration* and *Regional Policy Integration*—34%—provides preliminary support for our model that it makes sense to analyze both separately.

The regression results follow in Table 5 where we present the estimated models for Technical Inefficiency as the dependent variable. We present 7 models for various robustness checks. Models 1 and 2 test the hypotheses on the full sample, allowing for contemporaneous effects between the inputs and the outputs[4]. Models 3 and 4 test the hypotheses on the full sample, but introduce a one-year lag in the right-hand side variables to account for the possibility that the effects of the variables on the output and technical inefficiency may not be immediate (Elango and Pattnaik 2007; Grosse 1983; Hitt et al. 2006). Models 5 and 6 test the hypotheses on the full sample, but introduce a two-year lag in the right-hand side variables to test if the effects persist over time[5]. Model 7 tests the hypotheses also with a one-year lag in the right-hand side variables, but on a restricted sample on years 2002–2006 only, as Japan signed a free trade agreement with Singapore in 2002 for increased economic cooperation[6]. Thus, we reran the models by using this FTA instead of APEC as the moderator. We thought this was a useful robustness check, as APEC involves non-Asian countries, which are not part of Japan's home region, so we wanted to test if the results remain robust to this change.

Across models 1–6, a higher HRF is associated with a higher degree of technical inefficiency, but only models 1–4 show a statistically significant effect, keeping both interactions at zero, since this is a conditional relationship. Interestingly, model 7 shows that a larger HRF is associated with a decrease in firms' technical *in*efficiency, keeping the interaction at zero, thus confirming H1 in model 7. To truly understand the effect of HRF on technical inefficiency at varying levels of regional integration, we took the first partial derivative of technical inefficiency with respect to HRF and solved for the minimum value of *Regional Economic Integration* needed to reduce technical inefficiency (e.g., this procedure yielded 0.46 in model 3 so values above that threshold would help reduce the firms' technical inefficiency, supporting H1 and H2 for that range). Across all models, the interaction between HRF and *Regional Economic Integration* is negative, but it is statistically significant only in models 1–4 and 7. This lends support to our H2 as it indicates that as HRF increases, firms that are based in regions with greater regional economic integration see a reduction in their technical inefficiency; i.e., they become more technically efficient when there is a strategic fit between HRF and Regional Economic Integration. We did not find support for H3 in either of the models, suggesting *Regional Policy Integration* does not play a significant moderating role as previously thought. Overall, we find that HRF and its interaction with *Regional Economic Integration* significantly affect firms' technical inefficiency in the same year and up to 1-year lags, but not at 2-year lags, suggesting their effects wear out over time.

To better understand the significant interaction effect between HRF and *Regional Economic Integration*, we graphed it in Fig. 2 from the estimated coefficients in model 3. Figure 2 shows that as HRF increased and firms were becoming more regional, firms based in RTAs with higher *Regional Economic Integration* were becoming less techni-

Table 5: Regression results

		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
		Full sample/no lags	Full sample/no lags	Full sample/1 lag	Full sample/1 lag	Full sample/2 lag	Full sample/2 lag	Restr. sample/1 lag
Technical inefficiency function (*Dependent variable: technical inefficiency*)								
	H1:							
HRF		0.185†	0.176†	0.223*	0.241*	0.078	0.046	−0.076†
Regional economic integration		0.023	1.021	1.5012†	1.425†	1.889*	2.089*	0.624†
Regional policy integration			−9.867†	−1.985*	−1.938*	−1.319*	−1.451*	−9.534***
HRF × regional economic Integration	*H2:*	−0.378*	−0.411†	−0.489*	−0.556*	−0.307	−0.143	−0.073†
HRF × regional policy integration	*H3:*		0.047		0.051		−0.127	
Cost of capital		0.046	0.040	0.055*	0.054*	−0.009	−0.010	0.063*
Cost of employees		0.109***	0.188***	−0.004	−0.006	−0.029	−0.023	−0.011
Time trend		0.341	0.228	0.061	0.061	−0.213	−0.209	−0.399
R&D intensity		−0.005	−0.002	0.025	0.029	0.045	0.036	0.031
Marketing intensity		0.024	0.024	0.063	0.060	0.051	0.055	0.103
Industry diversification		−0.045**	−0.044**	−0.063***	−0.062***	−0.064***	−0.063***	−0.056**
Internationalization		−0.323***	−0.287**	−0.411***	−0.419***	−0.505***	−0.486**	−0.321**
Firm age		−0.441***	−0.467***	−0.533***	−0.533***	−0.509***	−0.510***	−0.488**
Domestic market potential		−1.913	−1.398	−2.037†	−1.960†	−1.082	−1.319	−1.589
Regional output		0.051	−0.035	−0.143	−0.142	0.026	0.032	−0.593**
Constant		25.379†	29.777†	27.294*	26.497*	16.219	18.673	31.955
Log-likelihood		−1,647.045	−1,639.488	−1,506.915	−1,506.759	−1,081.917	−1,080.679	−1,352.389
AIC		*1.263*	*1.260*	*1.530*	*1.532*	*1.576*	*1.577*	*1.785*
N		*2,658*	*2,658*	*2,013*	*2,013*	*1,415*	*1,415*	*1,552*

†$p<0.10$; *$p<0.05$; ** $p<0.01$; ***$p<0.001$. t-statistics and baseline production function results omitted for space consideration

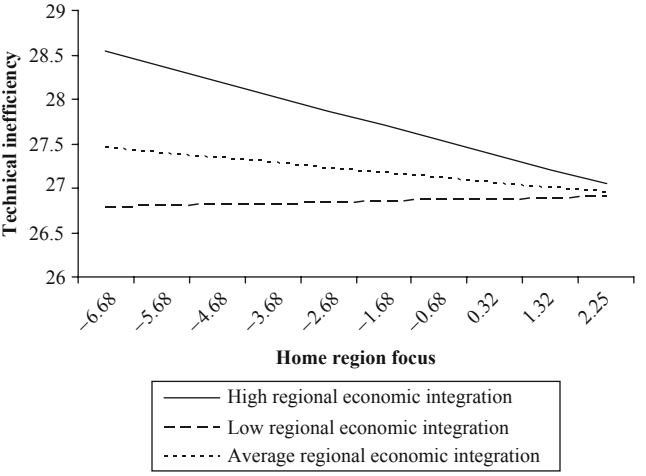

Fig. 2: Regional economic integration, HRF, and technical inefficiency. (Higher values of technical inefficiency designate less efficient firms. Higher values of home region focus designate more regional firms)

cally inefficient (declining solid line), suggesting the presence of important advantages from regionalization. Conversely, as HRF decreased and firms were becoming more global, firms based in RTAs with lower *Regional Economic Integration* were becoming less technically inefficient (large dotted line), suggesting the presence of disadvantages from regionalization. We also graphed the interaction at the average level of *Regional Economic Integration* (small dotted line) and found that as firms increased their HRF, average *Regional Economic Integration* helped decrease their technical inefficiency, consistent with our overall conceptual framework.

Lastly, we also calculated firms' technical efficiency *per se* by the $\exp(-U_{i.t})$ transformation. Thus derived, technical efficiency lies on a range of 0 (least efficient) to 1 (most efficient). After we estimated $U_{i.t}$ from model 3 for each firm, we then estimated the proximity to best practices of each firm by dividing each firm's calculated technical efficiency by the maximum technical efficiency of its country and industry. This proximity to best practices ranges from 0 (the focal firm is the worst practice firm) to 1 (the focal firm is the best practice firm).

We performed a post-hoc test to find out which of the three RTAs was the most conducive to greatest proximity to industry best practices. The results showed that the EU MNEs were the closest to the industry best practices, operating on average at 46.17% of their best production frontier. The MNEs based in NAFTA were the second most technically efficient, operating at an average of 20.39% from their best practices industry standards. The Japanese MNEs were the least efficient as they operated at only 16.20% of their best practices frontier. These post-hoc results are consistent with the pyramidal structure of different RTA types described by Balassa (1961). This leads to interesting theoretical, policy, and managerial implications and venues for future research, which we discuss next.

Discussion and Conclusion

Theoretical Implications

Our conceptual framework and empirical results bear interesting implications for future theory building. First, we extended the regional/global strategies literature by conceptualizing and analyzing the effects of HRF on firms' technical efficiency, a significantly understudied performance metric in the regional/global strategies literature. We build on but also depart from prior regional/global strategies studies by directly testing the effect of HRF on firms' distance from their most efficient production frontier.

We extended the recently-advanced TCE theoretical perspective on regional/global strategies of MNEs (e.g., Elango 2004; Li 2005; Rangan and Sengul 2009; Rugman and Verbeke 2004, 2005, 2008) by proposing that the general predictions of the theory are not universal but contingent on the regional economic integration within the firms' home region trade agreement. The classic TCE perspective on regional/global strategies has suggested that regional strategy (i.e., a high HRF) tends to be associated with advantages from regionalization and efficiency gains for the MNE. However, we showed that Triad MNEs do not always experience advantages from regionalization from a high HRF, but sometimes regional strategy can be detrimental to their overall technical efficiency and can lead to larger gaps from the most efficient frontier, depending on the regional economic integration within the home region. The presence of such advantages and disadvantages from regionalization are a novel and timely extension to the TCE perspective on regional/global strategies.

Analyzing the advantages and disadvantages from regionalization also addresses Hejazi's (2005, p. 423) call that further research is needed to determine if a high HRF implies that the MNEs are "operating optimally" and whether a regional concentration of their activities "is consistent with profit maximization." We build on this notion as our analysis suggested that a high HRF can be a sub-optimal strategy when not aligned with regional economic integration.

Our analysis also found a condition—when regional economic integration is low—under which a global strategy (i.e., low HRF) is better for the MNE. This finding suggests that global strategy is a viable and potentially lucrative strategy that can be beneficial for MNEs. Our results here support prior research that has also found a global strategy to be associated with performance benefits (e.g., Banalieva and Santoro 2009; Elango 2004). However, we find that the allure of a global strategy gradually diminishes as regional economic integration deepens.

This study showed that advantages and disadvantages from regionalization can be amplified or reduced, depending on the degree of regional economic integration. Specifically, this is the first study to theorize and document that a strategic fit between firm-level strategy (HRF) and regional-level institutional characteristics (regional economic integration) is needed before firms' technical efficiency is optimized. Thus, our research supports Rugman and Verbeke's (2004, 2005, 2008) argument that "strategic linking investments" between firm and regional advantages are most optimal for firms' efficiency. Our study also helps provide a more microeconomics perspective on firm strategy, which,

as noted earlier, has been another understudied area in the international business/strategy research.

Lastly, we also extend the macroeconomics' literature of how regional economic integration affects firms' efficiency. To date, this literature has suggested that a greater intra-RTA trade vis-à-vis trade with the rest of the world enhances firms' efficiency due to scale and scope economies. We agree with this view but also depart from it as our results showed that even when MNEs were based in home regions with a high regional economic integration, the MNEs may not enjoy superior technical efficiency unless their HRF increases. Conversely, we also found that even if the regional economic integration is low, it does not automatically mean a reduced technical efficiency for the firms, especially if the firms follow a global market penetration strategy. Thus, our framework and results provide a more nuanced view on two key literatures: the TCE perspective on regional/global strategies of MNEs and the expected efficiency gains from regional integration.

Policy Implications

Our main finding is that regional economic integration enhances the technical efficiency for firms as HRF increases. Thus, if one of the main goals of policy decision makers is to improve the technical efficiency and, consequently, the efficiency and competitiveness of their home regional MNEs, we suggest they continue promoting policies that increase the level of trade integration within their home region RTAs. Protectionist policies within the RTA must be avoided since over time they would tend to create higher prices for the consumers of the import-restricting countries within the RTA and therefore increase the costs from disadvantages from regionalization for the MNEs with a high HRF.

Our research also sheds more light on the policy debate of whether regionalism is harmful or helpful in today's interconnected economies (e.g., Bhagwati 2002; Rugman and Verbeke 2005). For instance, opponents of regionalism argue that RTAs create a "spaghetti bowl" of discriminatory agreements among countries that unnecessarily complicate multilateral trade with non-members. Conversely, proponents of regionalism have argued that "regionalism is often an efficient substitute for ill-functioning multilateral institutions" (Rugman and Verbeke 2005, p. 4). Our results add to this debate by showing that regional economic integration is beneficial for firms' HRF-technical efficiency relationship, thus supporting the need for greater trade liberalization and more collaboration among RTA members.

Managerial Implications

We showed that MNE managers need to look beyond standard firm-level factors and consider the effect of regional-level phenomena, like regional economic integration, on their HRF- efficiency relationship. In particular, MNE managers need to realize that just pursuing a regional or global strategy does not automatically lead to efficiency. It is the strategic alignment between their firms' HRF and the regional economic integration that ultimately leads to advantages from regionalization and, hence, technical efficiency gains. Conversely, if managers pursue a low HRF strategy, we suggest they can achieve technical efficiency when they are based in RTAs with lower regional economic integration.

Caveats and Future Research

Future research can extend ours in a number of useful ways. First, consistent with much of the prior research in the regional/global strategy literature (e.g., Banalieva and Santoro 2009; Li 2005; Rugman and Verbeke 2004, 2008), we too focused primarily on MNEs' sales revenues to capture their HRF. Future studies could expand our work by examining other forms of MNEs' international involvement, such as foreign direct investment, assets or employees, which were unfortunately largely unavailable to us in this study. Second, future research can also examine the moderating effect of home RTAs on the technical efficiency of non-home region-based MNEs as the advantages of regional integration may also extend to such MNEs[7]. Third, we focused on trade integration as a key characteristic of regional economic integration. It may be equally interesting if future research extends this study by analyzing the moderating effects of other types of regional integration factors like, e.g., financial integration or common currency zones.

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Endnotes

1 Since some of the explanatory variables contained 0 values of which ln cannot be taken, we followed prior scholarship (e.g., Li 2008) and assigned a minimal number (+0.001) instead of the 0 values in order to allow for the proper ln-transformation.

2 Since the cost of employees was not consistently reported for all the firms in our sample, we assigned a zero value for such missing cases to avoid unnecessary sample reduction. We followed Vorhies et al. (2009) and took the ln of (− 1/variable) in the cases where some of the variables had a negative value. This helped avoid unnecessary loss of observations and preserve the continuity of the transformed variables.

3 We considered APEC to be a pre-FTA type of agreement because "APEC is much less institutionalized and cohesive than, say, the EU and NAFTA. The current unity within APEC is certainly looser than the unity in a typical FTA with binding rules, the first stage of economic integration, not to mention the unity in a more advanced stage such as a customs union or a common market" (Park and Lee 2009). Even though the U.S. belongs to APEC as well, we assigned the U.S. to NAFTA as we were interested in capturing the effect of the most advanced type of RTA for each home country's MNEs, and NAFTA is a more advanced type of RTA than APEC.

4 Model 2 produced a warning of a flat likelihood function, so its results should be interpreted with caution.

5 We thank an anonymous reviewer for suggesting this point.

6 We searched the World Trade Organization's Regional Trade Agreements database for all existing trade agreements that Japan is a member of as of May 2011. The database lists that Japan has signed a number of agreements with several Asian partners, including ASEAN, Indonesia, Malaysia, Philippines, Thailand, and Viet Nam, but they came into effect after the 2000–2006 period of our sample, and hence we could not use them in our analyses.

7 We thank an anonymous reviewer for this insight.

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