Domestic and Cross-border Acquisitions by Multinationals under Trade Liberalization*
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Abstract
This paper models a multinational firm’s (MNE’s) choices to acquire/sell a productive asset in multiple markets. In line with evidence, the model predicts that volumes of domestic and cross-border acquisitions are positively correlated and that more domestic acquisitions are realized in equilibrium. The more asymmetric the pre-liberalization asset holdings of the MNE across home and foreign markets, the more likely that trade liberalization results in domestic acquisitions. These are accompanied by cross-border acquisitions only if additional conditions are satisfied, e.g., if the MNE’s residual demand is sufficiently large in foreign markets. These acquisitions may harm consumers by raising product prices across multiple markets.

JEL classifications: F23, L12, L41, F13
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1 Introduction

Since the late 1980s, there has been a proliferation of regional trade agreements (RTAs) worldwide. According to the WTO, the cumulative number of RTAs in force increased from around 50 in 1990 to 379 as of June 2014.\textsuperscript{1} During the same period, there has been a sharp increase in the volume of mergers and acquisitions (M&A).\textsuperscript{2} According to the Thomson SDC Platinum database, the total number of M&A deals worldwide increased from around 15000 in 1990 to more than 44000 in 2012. Since 2012 the upward trend has continued, with global M&A activity at a seven year high as of June 2014.\textsuperscript{3} Much of this M&A activity has been driven by large MNEs which already owned production facilities in multiple countries when the trade treaties were implemented.\textsuperscript{4} Consider such a firm with asymmetric holdings across countries which are in the process of reducing their trade barriers. Would the firm gain by selling assets in countries where it owns more assets and acquiring assets in countries where it does not? Or, would the firm gain by selling assets in countries where it owns less assets in an effort to consolidate its holdings in a few countries? Or, would it be optimal for the firm to either acquire or sell assets in all countries simultaneously?

In this paper, I develop a framework to model the choices made by a multinational firm (MNE) regarding the distribution of its holdings of productive assets internationally when faced with trade liberalization. Within the context of this paper, the term "productive asset" refers to assets that serve as factors of production, for example, a tangible asset such as capital or an intangible asset such as marketing capabilities, rather than a financial asset. In contrast to the existing literature, I explicitly model the pre-liberalization asset holdings of the MNE. That is, the MNE initially holds a given amount of the productive

\textsuperscript{1}According the WTO, there has been a consistent upward trend in the number of RTAs since the 1990's, which is likely to continue with many RTAs negotiation still underway. See http://www.wto.org/english/tratop_e/region_e/regfac_e.htm. In Europe, the move towards free trade has been a necessary step towards closer economic integration. In North America, tariffs on most manufactured goods have decreased substantially as a result of the Canada-US Free Trade Agreement (CUSFTA) signed in 1989 and the North American Free Trade Agreement (NAFTA) signed in 1994. Moreover, the US has recently announced plans for an ambitious Trans-Atlantic Trade and Investment Partnership with Europe.

\textsuperscript{2}In this paper, the terms "merger" and "acquisition" are used interchangeably.

\textsuperscript{3}For details, please refer to: http://www.reuters.com/article/2014/06/30/us-deals-m-a-idUSKBN0F50A920140630.

\textsuperscript{4}In the case of the impending Comprehensive Economic and Trade Agreement (CETA) between Canada and the E.U., for example, prior to the implementation of CETA, several Canadian MNEs already hold productive assets in the E.U. (for example, Bombardier, Alcan, Magna International, SunLife Financial Services), and several European MNEs already hold productive assets in Canada (for example, Duetsche Bank, Rabo Bank, Societe General Bank, UBS).
asset in each country, and this amount may vary across countries. The MNE can either increase its holdings in each country by acquiring more of the productive asset from rival firms or decrease its holdings by selling off some of its initial holdings. It is assumed that the market in which the MNE’s initial asset holdings are the highest is its "home" market. Acquisitions undertaken by the MNE in this market are "domestic" acquisitions, whereas those undertaken by the MNE in other markets are "cross-border" acquisitions. Both the asset markets and the final goods markets are assumed to be segmented across multiple countries.\(^5\) I show that the response to trade liberalization is fundamentally different from one industry to another, depending crucially on the existing pattern of the MNEs’ asset holdings across countries at the moment when trade liberalization is implemented.

This key feature of the model is important since it enables this paper to highlight a number of novel mechanisms. In the model, each acquisition leads to cost reductions that increase the MNE’s output. Trade liberalization, by allowing the MNE to export this additional output, allows the MNE to increase the product price in the home market to a greater extent subsequent to a domestic merger than in a closed economy setting. This ability of the MNE to export subsequent to an acquisition has two effects. Effect 1: It increases the profitability of domestic acquisitions by increasing the market power effect of the domestic acquisition. Effect 2: It reduces the reservation price of foreign firms by reducing the product price in the foreign market, and thus the profits of foreign firms.\(^6\) Thus, trade liberalization increases the volume of domestic acquisitions and may simultaneously increase the volume of cross-border acquisitions. This is consistent with the positive correlation between domestic and cross-border merger volumes observed in the data, as documented in the following section.

The above mechanism is only effective if the pre-liberalization asset holdings of the MNE

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\(^5\)This is in line with empirical evidence in support of the existence of market segmentation across countries (see, for example, Atkeson and Burstein (2008), Gopinath et al (2011) and Knetter (1989, 1993) for evidence of price discrimination by exporting firms across different destination countries). Moreover, productive assets such as certain types of physical capital or production facilities are immobile geographically resulting in asset markets that are naturally segmented across countries. Alternatively, consider the “resource-based view of the firm” popular in the Management Strategy literature, which posits that each firm is endowed with a set of complementary “capabilities” or intangible assets. Some capabilities, such as marketing, distribution, and country-specific institutional competency are imperfectly mobile across countries (see Anand and Delios, 2002; Nocke and Yeaple, 2007), resulting in markets for these intangible assets that are segmented across countries.

\(^6\)Other papers that endogenize the price of acquisitions include Kamien and Zang (1990, 1991, 1993), Faulli-Oller (2000) and Gowrisankaran and Holmes (2004). These papers are restricted to a single integrated market which is equivalent to a closed economy setting.
is sufficiently asymmetric across countries. If the MNE holds similar volumes of assets across countries, then subsequent to an acquisition, despite the cost reductions, the MNE does not find it profitable to increase its exports. This dampens both Effect 1 and Effect 2 as described above, and simulation results show that the MNE would sell off assets instead of acquiring them.\footnote{See Norback, Tekin-Koru and Waldkirch (2013) for an empirical study of factors affecting plant divestiture decisions taken by firms.} Hence the importance of explicitly accounting for the pre-liberalization asset holdings of the MNE is sufficiently asymmetric across countries.\footnote{Most existing studies that examine the choices made by MNEs treat cross-border M&A as a "mode of entry" into a foreign market (Barba-Navaretti et al, 2004; Caves, 1996; Klimenko and Saggi, 2007; Markusen, 2002; Mattoo, Olarreaga and Saggi, 2004; Helpman, Melitz and Yeaple, 2004; Nocke and Yeaple, 2007, 2008). By treating cross-border M&A as a means of accessing a new market, these papers abstract away from the implications of the existing holdings of the MNE in different markets on the MNE's decision to acquire rival firms in the face of trade liberalization.}

The paper also determines a set of conditions under which domestic acquisitions are realized in isolation, without being accompanied by cross-border acquisitions. For example, if the residual demand faced by the MNE is sufficiently small in foreign product markets, then the MNE's exports do not significantly alter the product price in foreign countries, and therefore, the domestic acquisitions are not accompanied by cross-border acquisitions. This provides one possible explanation as to why the volume of domestic mergers is larger than and has grown more than the volume of cross-border mergers during the period of trade liberalization, as documented in the following section. Moreover, this also provides a possible explanation for why M&A activity has evolved differently in response to different trade treaties. For example, while the main response to the signing of the Canada U.S. Free Trade Agreement (CUSFTA) in 1989 was in the form of domestic M&A in Canada (see Breinlich, 2008), in anticipation of the E.U. Single Market Treaty (1992), cross-border M&A played a much larger role within the E.U. since the late 1980's (see, for example, Brakman et al, 2006; Coeurdacier, de Santis and Aviat, 2009).\footnote{Given that the difference in economy size between the U.S. and Canada is much larger than that among the rich European countries, Canadian firms face a smaller residual demand in the U.S. market than firms from the richer European countries do in each others' markets. The difference in the M&A responses to the two trade treaties is thus consistent with the predictions of the theoretical framework developed in this paper.}

Most related studies have focused on the relation between trade liberalization and cross-border mergers (see, for example, Horn and Persson, 2001; Evenett, 2004; Bertrand and Zitouna, 2006; Brakman, Garretsen and van Marrewijk, 2006; Neary, 2007; Hijzen, Gorg and Manchin, 2008; Coeurdacier, de Santis and Aviat, 2009; Erel, Liao and Weisbach, 2012;
Tekin-Koru, 2012; Brakman et al, 2013). Given that, during the same period, the volume of domestic mergers has grown more than that of cross-border mergers, it seems warranted that further research be carried out taking into account the impact of trade liberalization on domestic mergers.\(^{10}\) This paper also contributes to the literature on the determinants of endogenous mergers within an international context. In this literature, most papers use a combination of market power, synergies and trade cost savings to explain the realization of mergers in equilibrium (Benchekroun and Ray Chaudhuri, 2006; Bjorvatn, 2004; Falvey, 2005; Fumagalli and Vasconcelos, 2009; Gaudet and Kanouni, 2004; Horn and Persson, 2001; Long and Vousden, 1995; Neary, 2007; Norbäck and Persson, 2008; Spearot, 2013).

This paper identifies a novel explanation for merger waves arising in industries that serve multiple segmented markets based on the distribution of the pre-liberalization asset holdings of MNEs across countries undergoing trade liberalization.

The mechanisms outlined in this paper have important policy implications. A given set of countries should be more cautious of signing a free trade agreement the more asymmetric the asset holdings of MNEs across the countries. It is under these conditions that trade liberalization is most likely to trigger a wave of acquisitions across the countries leading to lower consumer surplus, thereby mitigating the benefits of trade liberalization. This poses a more pressing concern for developing countries and emerging markets since they often lack strong institutions including antitrust authorities and well-defined merger policies.

The paper proceeds as follows. Section 2 presents some empirical facts that motivate the theoretical framework developed in this paper. Section 3 presents the model. Section 4 analyzes the MNE’s acquisition and sell-off decisions under trade liberalization. Section 5 presents a numerical example. Section 6 discusses the policy implications of the main results. Section 7 discusses whether the main results derived using this theoretical framework carry over to alternate scenarios. Section 8 concludes.

\(^{10}\) Spearot (2013) also allows firms to undertake domestic and foreign acquisitions, and finds that the type of firms which undertake acquisitions for market access (cross-border acquisitions) are different for the type of firms that undertake acquisitions for cost reduction.
2 Domestic and Cross-border Acquisition Volumes: Some Empirical Facts

In this section, using data from the Thomson SDC Platinum database, I document four stylized facts regarding the evolution of domestic and cross-border M&A volumes:

1. The volumes of domestic and cross-border mergers are positively correlated.

2. The volume of domestic mergers has been consistently greater than that of cross-border mergers since the late 1980’s.

3. During the period in which trade liberalization has proliferated, the volume of domestic mergers has grown more than the volume of cross-border mergers.

4. The changes in domestic and cross-border acquisition volumes have been significantly different in response to different trade liberalization treaties.

These observations are illustrated by Figures 1-4.

Figure 1: Global Domestic and Cross-border Acquisition Volume

The first three stylized facts are illustrated by Figure 1 which shows the global volumes of domestic and cross-border acquisitions over time. In Figure 1, the volumes of domestic and cross-border M&A are clearly positively correlated. In fact, during the period 1982-2012,
the correlation coefficient between global domestic and cross-border M&A volumes is 0.982. There is a sharp increase in the trends of both domestic and cross-border M&A volumes beginning in the late 1980’s. Figure 1 also illustrates that the volume of domestic M&A has been consistently greater than that of cross-border M&A. This is in line with Spearot (2013) which states that cross-border M&A has consistently accounted for less than a third of total M&A activity globally. During the period in which trade liberalization has proliferated, that is since the late 1980’s in Figure 1, the volume of domestic mergers has grown more than the volume of cross-border mergers. During the period 1990-2012, global domestic M&A volume increased by 226%, starting from approximately 9600 deals, and cross-border M&A volume increased by 139%, starting from approximately 5200 deals.

The theoretical framework developed in this paper identifies trade liberalization as a common factor that encourages both domestic and cross-border M&A volumes. Moreover, the mechanism captured using this framework implies that there exists a structural link between the two volumes: the realization of domestic acquisitions paves the way for cross-border acquisitions. Thus, this paper provides one possible explanation for the positive correlation between domestic and cross-border M&A volumes that we observe. At the same time, a key result generated by this model is that the set of necessary conditions that need to be satisfied for cross-border acquisitions to be realized in equilibrium is more stringent than that required for domestic acquisitions which may explain why we observe more domestic rather than cross-border acquisitions. Therefore, the main predictions of the theoretical framework developed in this paper are consistent with the first three stylized facts presented above. Qualitatively similar observations are documented for North America and the E.U. in Figures 2-4.

Figure 2 plots the volumes of Canadian firms’ acquisitions of other Canadian firms and Canadian firms’ acquisitions of U.S. firms.
In Figure 2, there is a sharp increase in the volume of domestic M&A within Canada in 1988 (that is, just prior to the signing of the CUSFTA in 1989) and in 1994 (that is, when the North American Free Trade Agreement, NAFTA, was implemented). Relatively, the responses in terms of cross-border M&A volume are much smaller.

Figure 3 plots the volumes of U.S. firms’ acquisitions of other U.S. firms and U.S. firms’ acquisitions of Canadian firms.

Figure 3 illustrates that, compared to Canadian firms, the response in terms of both
domestic and cross-border M&A volumes are muted in the U.S.. In 1988-1989 and 1994, the same general trend for both domestic and cross-border M&A volumes continues without sharp increases. The U.S. firms’ lack of response to the CUSFTA may be explained by the fact U.S. firms have access to a much larger domestic market, and therefore were not significantly affected by CUSFTA. Indeed, according to Bernard et al (2007), of the 5.5 million firms operating in the United States in 2000, just 4 percent were exporters. In the model developed in this paper, I therefore focus on the M&A decision of an exporting firm, whose M&A decisions are more likely to be affected by trade liberalization.

Figure 4 plots the volumes of E.U. firms’ acquisitions of other firms within the same country (labeled as domestic acquisitions in Figure 4) and E.U. firms’ acquisitions of firms in other E.U. countries (labeled as cross-border acquisitions in Figure 4). In Figure 4, I have included the twelve original members of the E.U. Single Market Treaty signed in 1992, that is, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Portugal, and the U.K.. Note that the Single European Act, signed in Luxembourg in 1986 by these Member States was the first major step establishing the European Economic Community (EEC) which proposed a deadline of 1992 for implementing the Single Market Treaty.11 Figure 4 illustrates that around 1986 there was a sharp increase in both domestic and cross-border M&A volumes in these E.U. member states.

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A contrast may be drawn between Figures 2-3 on the one hand, and Figure 4 on the other in terms of the gap between the volumes of domestic and cross-border acquisitions. This gap is much larger for Canada and the U.S. than for the E.U. member states. Moreover, in line with the fourth stylized fact as listed above, Figures 2-4 illustrate that firms of different countries react quite differently to trade treaties in terms of their M&A decisions. For example, Figure 2 illustrates that Canadian firms responded to the CUSFTA of 1989 by sharply increasing domestic acquisitions whereas cross-border acquisitions of U.S. firms changed relatively little. U.S. firms did not respond significantly to the CUSFTA, as shown by Figure 3. These findings are in line with those of Breinlich (2008). On the other hand, E.U. firms sharply increased both domestic and cross-border acquisitions in the late 1980’s in anticipation of the E.U. Single Market Treaty which was signed in 1992. The theoretical framework developed in this paper identifies some of the country-specific factors that determine how the composition of domestic and cross-border acquisitions change in response to trade liberalization.

Before proceeding, it is useful to note that according to Andrade, Mitchell and Stafford (2001), most mergers in the 1990s are between firms within the same industry. To reflect this, the model developed in the following section models horizontal M&A.

3 The Model

Consider two countries, A and B.

The MNE is modeled as a dominant firm that can produce and sell the final product in both countries. The MNE can also export output produced in one country to the other. There exists a competitive fringe in each country consisting of local firms. Although I assume that the MNE is the only firm with market power, it is possible to show that similar

\footnotesize{\begin{enumerate}
  \item Using a difference in difference approach, Breinlich (2008) finds a substantial increase in the number of domestic transactions within Canada which is positively correlated with the magnitude of tariff cuts across sectors. For every 1% cut in tariffs, the number of domestic transactions within Canada increased by about 11% leading to a total CUSFTA-related increase of about 70% in the average sector. By contrast, he does not find any robust link between tariff cuts and either U.S. domestic mergers or cross-border mergers.
  \item Brakman et al (2006) report that the share of European firms buying other European firms as percentage of total cross-border mergers worldwide rose from about 19% during the pre-E.U. Single Market Treaty period (1986-1990) to about 34% of the world total since 1990.
  \item In order to outline the main mechanisms captured by this model as clearly as possible, this section presents a two-country version of the model. In Section 4, it is shown that the main results may be generalized to more than two countries.
\end{enumerate}}
results to those obtained in this paper may carry over to the case where all firms are Cournot oligopolists and, under certain assumptions, Bertrand oligopolists with product differentiation. (See Section 7 for further details.) This assumption simplifies the analysis while maintaining a structure that can address the fundamental question. Moreover, it is in line with evidence that exporting firms are more efficient than local firms (Helpman, Melitz and Yeaple, 1984; Melitz, 2003) and are, therefore, more likely to have market power.\textsuperscript{15}

The fringe firms cannot export. This is another assumption which, although not essential for the analysis conducted in this paper, simplifies the analysis. As long as there exist some firms in each country whose export volumes are lower than the MNE’s due to factors exogenous to the model, the main results would hold. This assumption is in line with evidence that firms are heterogeneous in terms of their ability to export (Helpman, Melitz and Yeaple, 1984; Melitz, 2003) and that there do exist local firms in many industries.

All firms produce a homogenous product. One of the inputs required in the production process is an industry-specific asset.\textsuperscript{16} The MNE is endowed with $s_A^0$ ($s_B^0$) units of the asset located in $A$ ($B$). The fringe in $A$ ($B$) is endowed with $f_A^0$ ($f_B^0$) units of the asset located in $A$ ($B$). The fringes in both countries consist of a continuum of firms, each of which possesses an infinitesimally small proportion of the asset. Let the total volume of assets be normalized to one, without loss of generality. The markets for the asset and the product are segmented across $A$ and $B$.

The model consists of two stages. During the first stage, acquisition and sell-off decisions are undertaken by all firms in the asset markets of the two countries. During the second stage, output decisions are undertaken by all firms in the product markets of the two countries. Throughout the paper, the superscript "\textsuperscript{0}" represents initial values, that is, endowments of the asset that are exogenously given at the beginning of Stage 1. The absence of the superscript denotes values at the end of Stage 1 subsequent to the acquisition and sell-off decisions undertaken endogenously by firms during Stage 1. The total asset volume remains unchanged by the acquisition and sell-off decisions undertaken by firms during Stage 1.

Before proceeding with the detailed descriptions of the two stages, it is useful to define

\textsuperscript{15} Other papers to use the dominant firm model to analyze acquisitions include Perry and Porter (1985) and Gowrisankaran and Holmes (2004). These papers assume the existence of a single market, rather than multiple segmented markets that are being served by the dominant firm.

\textsuperscript{16} This is a standard assumption in the merger literature. If the asset were not industry-specific, owners of the asset currently employed in other industries could enter this industry costlessly, in which case mergers would be rendered futile.
the following. Let \( v_{AA} (v_{AB}) \) represent the MNE’s Stage 2 product market profit in \( A (B) \) per unit of the asset located in \( A \). Similarly, let \( v_{BA} (v_{BB}) \) denote the MNE’s Stage 2 product market profit in \( A (B) \) per unit of the asset located in \( B \). Let \( \pi_A (\pi_B) \) denote the profit per unit of asset of each fringe firm located in \( A (B) \).

**Stage 1: Acquisition and sell-off decisions**

The MNE is assumed to behave as the price-setter in the asset market of each country. This implies that the MNE announces the market price of the asset in each country, and commits to buying (or selling) the amount of the asset that is supplied (or demanded) by the fringe firms at this price. It is assumed that all firms are forward-looking and take into account Stage 2 profits when making Stage 1 decisions. Each fringe firm in country \( i \) is indifferent amongst buying, selling and holding onto its assets if and only if the market price of the asset is equal to \( \pi_i \) for \( i \in \{A, B\} \) (the Stage 2 profit that the fringe firm would get if it decided not to sell the unit of asset). Thus, in equilibrium, the price of each unit of asset in country \( i \) is given by \( \pi_i \). Note that \( \pi_i \) is a function of \( s_i \) and \( s_j \). For notational convenience, the arguments of \( \pi_i \) are not explicitly mentioned henceforth. The relationship between \( \pi_i \) and \( s_i \) and \( s_j \) is derived in Corollary 1 in the following Section.

Starting with endowments \( s^0_A \) and \( s^0_B \), during Stage 1, the MNE chooses \( s_A \) and \( s_B \) to solve the following optimization problem:

\[
\max_{s_A, s_B} V = s_A (v_{AA} + v_{AB}) + s_B (v_{BA} + v_{BB}) - (s_A - s^0_A) (\pi_A) - (s_B - s^0_B) (\pi_B)
\]  

(1)

The first two terms represent the MNE’s returns if it enters Stage 2 with asset holdings of \( s_A \) and \( s_B \). Note that \( s_i - s^0_i \) for \( i = A, B \), may be positive or negative. If \( s_i - s^0_i > (<) 0 \), the MNE acquires (sells) the asset in country \( i \). The third and fourth terms of (1) denotes either the amount spent by the MNE on the acquisition of, or that received by the MNE due to the sale of, the asset in \( A \) and in \( B \) respectively.

**Stage 2: Output decisions**

Each firm has access to the same production process. Let \( q \) denote output per unit of the asset. Let \( c(q) \) denote the cost per unit of asset necessary to produce \( q \) units of the final

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\[17\] Note that a closed economy version of this model, where the dominant firm serves one market instead of two segmented markets, is equivalent to the single period model presented in Section 3 of Gowrisankaran and Holmes (2004). Note also that, unless trade costs are set to zero, cross-hauling à la Brander (1981) will not occur in equilibrium.
product where \( c(q) \) is strictly convex and strictly increasing, and \( c'(0) = 0 \). The convexity of the cost function implies that the smaller the output level per unit of asset, the lower the marginal and average cost. The greater the volume of assets held by a firm, a given output level can be spread across more assets thereby reducing the output produced per unit of asset. Thus, under this cost function, the greater the volume of assets held by a firm, the lower its marginal and total cost of production.

For \( i \in \{A, B\} \), the inverse demand function in country \( i \) is given by \( p_i = P_i(Q_i) \), where \( Q_i \) represents total sales of the final product, including imports, in country \( i \). Recall that the fringe firms are assumed to be local firms, that is, they are not allowed to export. Let \( y_i \) denote each fringe firm’s sales per unit of asset in country \( i \). Recall that the MNE is allowed to export output produced in one country to the other. The MNE faces a tariff of \( t_i \) per unit exported to country \( i \). Let \( q_{ij} \) denote the MNE’s sales per unit of asset in country \( j \) which are produced using assets located in country \( i \). Thus, we have the following:

\[
Q_A = s_A q_{AA} + s_B q_{BA} + (1 - s_A - s_B - f_B) y_A \tag{2}
\]

\[
Q_B = s_B q_{BB} + s_A q_{AB} + f_B y_B \tag{3}
\]

As in the case of the asset markets, the MNE is assumed to be the price setter in the product markets. The fringe firms take the MNE’s decisions as given when making their own output decisions. In country \( i \), each fringe firm solves the following:

\[
\max_{y_i} \quad p_i y_i - c(y_i) \tag{4}
\]

Let \( \tilde{y}_A \) and \( \tilde{y}_B \) denote the equilibrium quantities chosen by the fringe firms. Given (2) and (3), we have that \( \tilde{y}_A \) and \( \tilde{y}_B \) are functions of the MNE’s output choices.

Given the fringe firms’ reaction functions, \( \tilde{y}_A \) and \( \tilde{y}_B \), the MNE solves the following

\[18\] A convex cost function is chosen in order to ensure the existence of an equilibrium, given that the fringe firms are price takers. See Nguyen and Schaur (2010) for empirical evidence supporting the theory that markets are linked through convex costs. Section 7 discusses how the main results may carry over to other market structures such as oligopoly. In those cases, it may be possible to derive similar results using other cost functions, as discussed in Section 8.
optimization problem:

$$\max_{q_{AA}, q_{BA}, q_{BB}} \left\{ P_A(q_{AA}, q_{BA}) q_{AA} + (P_B(q_{AB}, q_{BB}) - t_B) q_{AB} - c(q_{AA} + q_{AB}) 
+ (P_A(q_{AA}, q_{BA}) - t_A) q_{BA} + P_B(q_{AB}, q_{BB}) q_{BB} - c(q_{BA} + q_{BB}) \right\}$$

(5)

4 MNE’s acquisition and sell-off decisions

This section discusses the factors driving the MNE’s acquisition and sell-off decisions at a given tariff level. Analysis of the effect of trade liberalization is postponed to the following section.

Let $MR_{ij}$ denote the MNE’s marginal revenue from selling $q_{ij}$.

**Lemma 1:** If either $s_A > 0$ or $s_B > 0$, or both, then $MR_{ij} < p_j$ for $i, j \in \{A, B\}$, and hence, $q_{ij} < y_j$.

**Proof:** See appendix.

Lemma 1 shows that, given the industry price, the fringe firms always sell more of the product per unit of the asset than the MNE in each country (regardless of the location of the MNE’s asset). This follows from the fact that the fringe firms equate price to marginal cost in each market whereas the MNE equates marginal revenue to marginal cost. A direct implication of Lemma 1 is that the average value per unit of asset is higher for the fringe firms than for the MNE. That is, $v_{ij} < \pi_j$, for $i, j \in \{A, B\}$.

The MNE’s demand for asset holdings in country $i$ is given by the marginal net benefit of holding assets in country $i$. The MNE’s marginal net benefit from holding assets in country $i$ is given by:

$$\frac{\partial V}{\partial s_i} = X_i - (s_i - s^0_i) \frac{\partial \pi_i}{\partial s_i} - (s_j - s^0_j) \frac{\partial \pi_j}{\partial s_i}, \quad i, j \in \{A, B\}$$

(6)

where

$$X_i \equiv v_{ii} - \pi_i + v_{ij} + s_i \frac{\partial (v_{ii} + v_{ij})}{\partial s_i} + s_j \frac{\partial (v_{ji} + v_{jj})}{\partial s_i}, \quad i, j \in \{A, B\}$$

(7)

The last two terms in (6) illustrate how buying a unit of asset in country $i$ allows the MNE to influence the equilibrium prices of the asset in countries $i$ and $j$, given by $\pi_i$ and $\pi_j$ respectively. The equilibrium values of $s_i$ and $s_j$ must simultaneously satisfy $\frac{\partial V}{\partial s_i} = 0$ and
Let us examine the components of $X_i$, as given by (7). From Lemma 1, we have that $(v_{ii} - \pi_i) < 0$. This term, thus, captures the MNE’s incentive to sell the asset to the fringe firms in country $i$. The terms $s_i \frac{\partial (v_{ii} + v_{ij})}{\partial s_i}$ and $s_j \frac{\partial (v_{ij} + v_{jj})}{\partial s_i}$ capture a combination of increased market power and cost savings experienced by the MNE as a result of acquiring more of the asset in country $i$. Subsequent to the acquisition of assets in country $i$, the MNE faces the following trade-off in country $i$. The first effect is that, due to increased market power, the MNE has an incentive to decrease the quantity sold in country $i$. The second effect is that the acquisition allows the MNE to split its total output equally across a greater volume of assets. Given a convex cost function per unit of asset, this reduces the MNE’s marginal cost of production. Thus, by the second effect, the MNE has an incentive to increase its total output. Lemma 2 shows the net effect of these two effects on the product prices in the two countries.

**Lemma 2:** We have that $\frac{\partial p_i}{\partial s_i} > 0$ and $\frac{\partial p_j}{\partial s_i} < 0$ for $i, j \in \{A, B\}$.

**Proof:** See appendix.

Lemma 2 shows that the market power effect dominates in country $i$, thereby raising the price of the final product in country $i$. By contrast, the MNE faces no trade-off in country $j$, since its market power in $j$ remains unchanged due to the acquisition in $i$. The only effect faced by the MNE in $j$ is the reduced marginal cost of production arising from the acquisitions in $i$, which explains the decrease in the price level in $j$, as stated by Lemma 2. Effectively, acquisitions in country $i$ cause the MNE to produce more in country $i$ and increase the volume of exports to country $j$.

Since Lemma 2 drives the main results in this paper, before proceeding, it is useful to note that Lemma 2 may hold under more general conditions than those presented in this section. For example, Lemma 2 also carries over to oligopolistic industries, that is, Cournot and, under certain assumptions, Bertrand competition with product differentiation, as shown by Ray Chaudhuri (2014). See Section 7 for further details. The key condition that needs to be satisfied for Lemma 2 to hold is market segmentation. Given that during the last two decades, each year about 60% of all cross-border mergers worldwide have been realized within service industries (see UNCTAD’s World Investment Reports, 2006-2010; Norbäck and Persson, 2008b), which are naturally segmented markets, it becomes important to analyze
the impact of Lemma 2 for the acquisition decisions of firms. When examining the merger waves that consolidated the banking sectors both in the US and in the EU during the 1980’s and 1990’s, a number of studies find evidence of increased third degree price discrimination by banks that were involved in acquisitions. For example, Focarelli and Panetta (2003) find that, on average, mergers increase market power, and lower the deposit rate offered by banks by about 16.6 basis points (3.3 percent of market rates) in the market in which the merger occurs in the year of the merger. In markets other than the one in which the merger took place, they find that over a period of three years post-merger, deposit rates offered by banks increase on average by 11 basis points. This is consistent with Lemma 2.

Corollary 1: We have that $\frac{\partial \pi_i}{\partial s_i} > 0$ and $\frac{\partial \pi_j}{\partial s_i} < 0$ for $i, j \in \{A, B\}$.

Proof: This follows from Lemma 2. See appendix for further details.

Corollary 1 implies that the asset price in country $i$ is increasing in $s_i$ and decreasing in $s_j$. It is assumed that the fringe firms cannot coordinate. Each fringe firm, therefore, takes as given the proposed acquisition by the MNE and determines its opportunity cost of selling out to the MNE. The greater the acquisition in country $i$, as represented by a higher $s_i$, the higher the product price, by Lemma 2, and therefore, the higher the opportunity cost to each fringe firms in country $i$ of selling out.\(^{19}\) This mechanism is captured within a closed economy framework by Gowrisankaran and Holmes (2004) which also uses a market structure with a dominant firm and competitive fringe firms. This mechanism is also applicable to oligopolistic scenarios, as shown by Kamien and Zang (1990) where they show that there exist limits to monopolization through acquisitions. The cross-country effect, $\frac{\partial \pi_i}{\partial s_j}$, is new to this model and arises because I allow for asset markets to be segmented.

Proposition 1: At any given non-prohibitive tariff level, the MNE is more likely to acquire assets in country $i$,

(i) the greater the MNE’s initial asset holdings in country $i$

(ii) and the lower the MNE’s initial asset holdings in country $j$

Proof: From (6) and given Corollary 1, it follows that:

\(^{19}\)This mechanism draws a parallel with that derived in Grossman and Hart (1980) where an individual shareholder’s reservation price of selling out to an acquirer increases in anticipation of the post-takeover improvement of the corporation.
From (8) and (9), the MNE’s marginal net benefit from acquiring the asset in country \(i\), \(\frac{\partial V}{\partial s_i}\), is increasing in \(s_0^i\) and decreasing in \(s_0^j\). It follows that \(\frac{\partial V}{\partial s_i}\) is greater the less symmetric the MNE’s initial asset holdings across the countries, \(s_0^A\) and \(s_0^B\). The greater is \(\frac{\partial V}{\partial s_i}\), the more likely that the MNE acquires assets in country \(i\), ceteris paribus.

The intuition behind (8) is as follows. The MNE’s efforts to raise price of the final product by reducing sales in country \(i\) subsequent to acquiring assets in country \(i\) is mitigated since the fringe firms react by increasing their sales. Thus, the lower is \(s_0^i\), the larger the fringe and, therefore, the harder it is for the MNE to benefit from increased market power in country \(i\) by acquiring assets in country \(i\). Hence, the MNE’s incentive to acquire assets in country \(i\) is increasing in \(s_0^i\).

The intuition behind (9) is as follows. The greater is \(s_0^j\), the lower the MNE’s incentive to export from country \(i\) to country \(j\) subsequent to the acquisition of assets in country \(i\), since exporting would reduce the returns per unit of asset already held by the MNE in country \(j\). Recall that, subsequent to an acquisition in country \(i\), the MNE experiences a lower marginal cost of production which causes its output level to increase. If \(s_0^j\) is low, the MNE exports this additional output to country \(j\). If \(s_0^j\) is sufficiently large, subsequent to acquisitions in country \(i\), the MNE chooses to raise its sales in country \(i\) rather than exporting the product to country \(j\). Hence, the larger is \(s_0^j\), the smaller is the market power effect \(\frac{\partial p_i}{\partial s_i}\) experienced by the MNE. Conversely, the lower is \(s_0^j\), the greater is \(\frac{\partial p_i}{\partial s_i}\) and the greater the MNE’s incentive to undertake acquisitions in country \(i\).

One interpretation of Proposition 1 is the following. In many cases, an MNE has the largest initial asset holdings in its home country’s market.\(^{20}\) In line with this, henceforth it is assumed that country \(i\) is the MNE’s home market if \(s_0^i > s_0^j\). Proposition 1 thus implies that the greater the asymmetry in the initial asset distribution of the MNE, the more likely

\[^{20}\text{This is in line with Neary (2007)’s assumption that firms are larger in their own market than in foreign markets. Note also that papers which model cross-border acquisitions as a mode of entry into a foreign market are focusing on a special case of this model, that in which the MNE holds a positive amount of assets in its home country and zero assets in foreign countries.}\]
that it will engage in domestic acquisitions. Next, I ask if the initial asset distribution also affects the MNE’s decision to engage in cross-border acquisitions.

Corollary 1 implies that the MNE’s acquisitions in country $i$ raise the asset price in country $i$ and decrease that in country $j$. Thus, acquisitions undertaken by the MNE in country $i$ make it cheaper to acquire further assets in country $j$. Note that this mechanism only works as long as the tariff level is non-prohibitive (that is, the tariff level is sufficiently low such that equilibrium exports are positive), as explained in the proof of Lemma 2. Henceforth, in the paper, it is assumed that tariff levels are non-prohibitive and that trade liberalization occurs in the form of a reduction of tariff from one non-prohibitive level to another.

**Proposition 2:** Cross-border acquisitions in country $j$ are more likely to be undertaken by the MNE

(i) when domestic acquisitions are undertaken by the MNE in country $i$

(ii) the less elastic the demand curve in both countries

(ii) and the larger the residual demand faced by the MNE as a proportion of total demand in country $j$.

**Proof:** From (8) and (9), the less symmetric the MNE’s initial asset holdings across the countries, the greater is $\frac{\partial V}{\delta s_i}$, and, therefore, the more likely that the MNE acquires assets in country $i$. These domestic acquisitions in country $i$ cause a reduction in the MNE’s marginal cost of production. This results in greater exports to country $j$ in Stage 2, in line with Lemma 2. Given that the fringe firms in country $j$ are forward-looking, the greater exports to country $j$ subsequent to the acquisitions in country $i$ result in a lower reservation price of each fringe firm in country $j$. This reduces the cost of acquiring firms in country $j$. Acquisitions in country $i$ are more likely to occur the lower elasticity of demand in country $i$, since the greater the market power effect. This completes the proof for (i). That is, the lower elasticity of demand in country $i$, the greater is $\frac{\partial V}{\delta s_i}$. The higher the elasticity of demand in country $j$ and the smaller the residual demand faced by the MNE as a proportion of total demand in country $j$, the smaller the impact of the increase in exports on the product price in country $j$, that is, the smaller is $\left| \frac{\partial p_j}{\delta s_i} \right|$. Therefore, the smaller the impact of the increase in exports on the reservation price of each fringe firm in country $j$. Conversely, the lower the elasticity of demand in country $j$ and the larger the residual demand faced by the MNE as a proportion of total demand in country $j$, the larger the impact of the increase in exports
on the reservation price of each fringe firm in country \( j \), that is, the larger is \( \left| \frac{\partial \pi}{\partial s_i} \right| \), and therefore, the cheaper the cost of acquiring firms in country \( j \). This completes the proof for (ii) and (iii). ■

While Proposition 1 states that the less symmetric the initial asset holdings of the MNE, the more likely that it undertakes domestic acquisitions, Proposition 2 states that cross-border acquisitions occur as a by-product of domestic acquisitions.\(^{21}\) This is in line with the empirical observation that domestic and cross-border merger volumes have been positively correlated globally during the last few decades. A natural question that arises in light of these findings is whether domestic acquisitions will always be accompanied by cross-border acquisitions. If not, then under what conditions do domestic mergers lead to cross-border mergers and under what conditions do they not? Proposition 2 (ii)-(iii) address these questions.

Although, for simplicity, I have not explicitly modeled home bias within consumers’ preferences, given the intuition provided by Proposition 2, it is possible to provide a conjecture about how preferences with home bias would affect the acquisition mechanism. Within this context, the inclusion of home bias reduces the residual demand faced by the MNE in country \( j \). The greater the degree of home-biasedness in country \( j \), the less likely that an international acquisition wave will be realized, since exports from country \( i \) to \( j \) would be less able to lower the reservation price of each fringe firm in country \( j \), given that consumers in \( j \) prefer goods produced domestically over imports.

Proposition 2 (ii)-(iii) imply that domestic acquisitions may not always be accompanied by cross-border acquisitions. This is in line with the empirical observation that domestic mergers have constituted more than two thirds of the total annual merger volume globally during the last few decades. According to Spearot (2013), using the Thomson SDC Platinum database, the yearly (count) share of foreign acquisitions within worldwide mergers over the period 1980-2006 is uniformly less than one-third. See also the related discussion in Brakman et al (2013). This is also illustrated by Figures 1-4.

Next, I ask how the equilibrium asset allocations, as chosen by the MNE during Stage 1, are affected if countries \( i \) and \( j \) sign a trade agreement by which tariffs \( t_A \) and \( t_B \) are

\(^{21}\) This provides a point of contrast with Horn and Persson (2001) and Fumagalli and Vasconcelos (2009). In the former paper, with trade liberalization domestic mergers are substituted by cross-border mergers in equilibrium. In the latter paper, cross-border mergers are more likely to occur in equilibrium than domestic mergers.
exogenously lowered. It is useful to interpret \( s_i^0 \) and \( s_j^0 \) to be the pre-liberalization equilibrium values. Starting at these values, how are the acquisition and sell off incentives of the MNE affected by tariff reduction?

**Proposition 3:** A reduction of tariff levels, \( t_A \) and \( t_B \), ceteris paribus, increases the MNE’s incentive to acquire assets in both countries, \( i \) and \( j \).

**Proof:** The first order condition associated with the MNE’s problem (5) in Stage 2 with respect to \( q_{ij} \) is given by:

\[
(P_j(Q_j) - t_j) s_i + (s_q q_{ij} + s_j q_{jj}) P'_j(Q_j) \frac{\partial Q_j}{\partial q_{ij}} - s_i c'(q_{ii} + q_{ij}) = 0
\]  

(10)

Differentiating (10) with respect to \( t_j \) and rearranging, it can be shown that \( \frac{\partial q_{ij}}{\partial t_j} < 0 \). For any given combination of \( s_i^0 \) and \( s_j^0 \), subsequent to an initial acquisition in country \( i \), the increase in the volume of exports to country \( j \) is higher the lower the tariff level, \( t_j \). If \( t_j \) is sufficiently high, subsequent to acquisitions in country \( i \), the MNE chooses to raise its sales in country \( i \) rather than exporting the product to country \( j \). Hence, the larger is \( s_j^0 \), the smaller is the market power effect \( (\frac{\partial p_i}{\partial s_i}) \) experienced by the MNE. Conversely, the lower is \( s_j^0 \), the greater is \( \frac{\partial p_i}{\partial s_i} \) and the greater the MNE’s incentive to undertake acquisitions in country \( i \). Moreover, the increase in the volume of exports to country \( j \) due to the lower the tariff level implies that the lower the tariff level, \( t_j \), the larger is \( \left| \frac{\partial q_{ij}}{\partial t_j} \right| \) for \( i, j \in \{A, B\} \). This reduces the reservation price of fringe firms in country \( j \) to a greater extent subsequent to acquisitions in country \( i \).

Consider Propositions 1-3 together. If 2(i) holds but 2(ii) and 2(iii) do not, then trade liberalization is more likely to lead to domestic mergers while if (i)-(iii) hold, trade liberalization is more likely to lead to both domestic and cross-border mergers. This provides a possible explanation for why mergers and acquisitions activity has evolved differently in response to different trade treaties. As noted in Section 2, while in anticipation of the Canada U.S. Free Trade Agreement (1989), the main response was in the form of domestic mergers and acquisitions in Canada (see also Breinlich, 2008), in the case of the E.U. Single Market Treaty (1992), the main response was in the form of cross-border mergers and acquisitions within the E.U. (see also Brakman et al, 2006).

These different outcomes are consistent with Proposition 2 since, given that the difference
in economy size between the U.S. and Canada is much larger than that among the rich European countries, Canadian firms face a smaller residual demand in the U.S. market than firms from the richer European countries do in each others’ markets. Indeed, the countries to engage in the most cross-border mergers in the late 1980’s and early 1990’s were the richest E.U. member states at the time, including UK, France, Germany, Netherlands, Switzerland, and Spain (Brakman et al, 2006). This is further evident from the fact that a large number of mergers within the E.U. are deemed to have a "Community dimension".22

4.1 More than two countries

Although, for ease of exposition, the paper has, thus far, used a two-country framework, it is possible to generalize the main results to cases with more than two countries. For example, consider the following scenario. Let the set of all countries being served by the MNE be denoted by \( \mathcal{N} \). Let \( M \subseteq \mathcal{N} \) countries decide to sign a regional trade agreement (RTA) which lowers the tariffs that each RTA-member charges to the other members. Let country \( D \) be the country where the MNE holds the largest initial volume of assets, that is, its home market.

**Proposition 4:**

(i) *The less symmetric the MNE’s initial asset holdings across the countries, that is, the larger is \( (s^0_D - \min_i s^0_i) \) for \( i \in \mathcal{N} \), the greater the volume of domestic acquisitions in \( D \).*

(ii) *Cross-border acquisitions are more likely to accompany the domestic acquisitions if the elasticity of demand is low, and the residual demand faced by the MNE is sufficiently large in \( i \neq D \).*

**Proof:** It is straightforward to show that Lemma 2 extends to the case with more than

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22 According to EC regulations, there is a "Community dimension" where (i) the combined aggregate worldwide turnover of all the companies is more than 5,000 million, and (ii) the aggregate Community-wide turnover of each of at least two of the companies is more than 250 million, unless each of the companies achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.

Any merger that does not meet these thresholds nevertheless has a Community dimension where: (i) the combined aggregate worldwide turnover of all the companies is more than 2,500 million; (ii) in each of at least three Member States, the combined aggregate turnover of all the companies is more than 100 million; (iii) in each of at least three Member States, the aggregate turnover of each of at least two of the companies is more than 25 million, and; (iv) the aggregate Community-wide turnover of each of at least two of the companies is more than 100 million; unless each of the companies achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State. For further details please refer to http://europa.eu/legislation_summaries/other/l26046_en.htm.
two countries, such that an acquisition in country $D$ would increase the exports of the MNE to all other markets, provided that tariffs between $D$ and each of these countries are non-prohibitive. An extension of (1) to allow for more than two countries implies that the MNE’s incentive to acquire assets is strongest in country $D$ and is increasing in the gap between its asset holdings in $D$ and other countries. The reasoning behind this is similar to that provided in the proof of Proposition 1-2.

The signing of the RTA results in greater trade flows within its members.

**Proposition 5:** The volume of domestic acquisitions undertaken by the MNE is greater if $D \in M$, and the volume of cross-border acquisitions in country $i$ is greater if both $i$ and $D$ are members of the RTA.

**Proof:** The proof of Proposition 5 is similar to that of Proposition 3. Domestic acquisitions in country $D$ become more profitable due to the greater market power effect of each acquisition caused by greater export volumes due to the RTA. More cross-border acquisitions are realized amongst the RTA members than the non-members because the RTA-induced increase in the volume of exports amongst the RTA members reduces the reservation of price of fringe firms subsequent to acquisitions in $D$ more than in the non-member countries.

Together, Propositions 4 and 5 imply that the RTA is more likely to trigger an international acquisition wave, consisting of both domestic and cross-border acquisitions, the larger is $(s^0_D - \min s^0_i)$ and if $D \in M$.

The role played by the initial asset holdings of the MNE within this context is further emphasized by the following example. Example 1 shows that under standard assumptions on demand and supply conditions, trade liberalization does not always trigger acquisition waves. In fact, the MNE may sell-off assets in the country where its pre-liberalization asset holdings is low despite trade liberalization. It is only when the initial distribution of the MNE’s asset holdings across countries is sufficiently asymmetric that trade liberalization triggers a wave of acquisitions across all countries.
5 An Example

Example 1: Consider two countries, A and B, with identical linear demand functions given by:

\[ P(Q_i) = a - bQ_i, \quad i \in \{A, B\} \]

The tariff level is assumed to be equal in both countries, that is, \( t_i = t \) for \( i \in \{A, B\} \). Trade liberalization is assumed to be in the form of bilateral tariff reductions, that is, equal tariff reductions in both countries. This reflects the signing of a free trade agreement between the countries. For each firm, the cost per unit of asset that is incurred in the production of \( q \) units of the final product is given by:

\[ c(q) = \frac{1}{2}q^2 \]

The two countries possess equal stocks of the asset. Given that the asset is immobile across the border, we have that \( s^0_i \in [0, 0.5] \) and \( s_i \in [0, 0.5] \) for \( i \in \{A, B\} \).

Using the functional forms in Example 1, and parameter values \( a = 100 \) and \( b = 1 \), I generate the optimal asset holdings of the MNE in both countries as functions of its initial holdings, that is, \( \tilde{s}_A(s^0_A, s^0_B) \) and \( \tilde{s}_B(s^0_A, s^0_B) \), for different tariff levels.

The effect of trade liberalization on the acquisition and sell-off decisions of the MNE are illustrated by Figures 5-6, which show a cross section of the functions \( \tilde{s}_A(s^0_A, s^0_B) \) and \( \tilde{s}_B(s^0_A, s^0_B) \) at \( s^0_B = 0.1 \) for different values of \( t \). Similar patterns of acquisition and sell-off decisions are observed for other values of \( s^0_B \).
In Figures 5-6, an acquisition wave across both countries corresponds to \( s_A > s_A^0 \) and \( s_B > s_B^0 \).

**Result 1:** For a given value of \( s_B^0 \), there exists \( s_A^0 \in [0, 0.5] \) such that both domestic and cross-border acquisitions are realized if \( s_A^0 > s_A^0 \), with \( s_A^0 \) increasing in the tariff level.

Result 1 is consistent with Propositions 1 and 3. Given that \( s_B^0 = 0.1 \), the acquisition wave is triggered only if \( s_A^0 \) is sufficiently larger than 0.1, in line with Proposition 1. Figure 1 further illustrates that \( \tilde{s}_A \) is increasing in \( s_A^0 \), in line with \( \frac{\partial^2 V}{\partial s_A \partial \tilde{s}_i} > 0 \), as shown in the proof of Proposition 1. In line with Proposition 3, trade liberalization causes the threshold value
of $s_A^0$ beyond which the acquisition wave across both countries is triggered, $s_A^0$, to decrease. Figures 5-6 illustrate that the lower the tariff level, the greater the volume of acquisitions in both countries, for any $s_A^0$. Figure 6 illustrates that, given a value of $s_B^0$, the larger is $s_A^0$, the smaller the tariff reduction necessary to initiate the acquisition wave. For instance, for $s_A^0 = 0.25$, a tariff reduction from 2 to 1 is sufficient to initiate an acquisition wave. However, for $s_A^0 = 0.2$, the same tariff reduction is not sufficient to initiate the acquisition wave. The wave is only initiated for greater reductions in the tariff level, such as from 2 to 0.1.

Whilst Propositions 1-5 focus on the conditions which induce the MNE to acquire assets, Example 1 illustrates that, under standard assumptions on demand and supply, the MNE may also find it profitable to sell-off its assets when those conditions are not fulfilled. As shown in Figure 6, for sufficiently high tariff levels, the MNE sells off assets in the country where it owns less assets pre-liberalization. This is the case, for example, in country B, for $t = 2$ and $s_A^0 < 0.28$. Subsequent to the sell-off by the MNE in country B, exports to country A decrease since the fringe firms are not able to export. This increases $p_A$ and, thus, $\pi_A$, making it more expensive for the MNE to acquire assets in country A. Therefore, the sell-off in country B is associated with a lower volume of acquisitions in country A, as shown in Figure 5. Moreover, in line with Proposition 1, this mechanism only functions if $(s_A^0 - s_B^0)$ is sufficiently small.

The general conclusion in the related literature is that trade liberalization increases the volume of cross-border mergers (see, for example, Brakman, Garretsen and van Marrewijk, 2006; European Commission, 1996). Unlike most other studies of cross-border mergers, by allowing the MNE to choose between sell-offs and acquisitions, this paper contributes to the literature by providing a more nuanced testable prediction. As illustrated by Example 1, trade liberalization does not necessarily result in a wave of acquisitions across all countries undergoing trade liberalization. Whether an international acquisition wave is realized depends crucially on the degree of asymmetry of the MNE’s pre-liberalization asset holdings across countries.

6 Policy Implications

The importance of the results obtained in the previous sections lies in the ensuing policy implications.
Let us suppose that, in line with the recent trend both in the US and in the EU, when evaluating the welfare implications of mergers, countries focus on consumer surplus (Whinston, 2006). As per Lemma 2, in each country, consumer surplus decreases in response to acquisitions within that country and increases in response to acquisitions in other countries. Therefore, in the face of an international acquisition wave, that is, simultaneous acquisitions in multiple countries, the effect on consumer surplus of individual countries is ambiguous, depending on the functional forms of demand and cost. It is possible to show that under standard assumptions, an international acquisition wave may reduce consumer surplus in either some or all countries. This is the case in Example 1.

One of the key reforms in the Merger Guidelines in the US in 1997, and in the EU in 2004, has been to allow the "efficiency defense" as legitimate grounds for undertaking a merger (see Kolasky and Dick, 2003). Advocates of the efficiency defense base their reasoning on the findings of Williamson (1968) who illustrated that horizontal mergers may increase consumer surplus and social welfare if the merger-induced increase in productive efficiency is sufficiently great as to compensate for the effect of increased market power of the merger participants. In light of the findings of this paper, an antitrust authority needs to be cautious of the efficiency defense argument when the merger participants serve multiple segmented markets since, despite the realization of merger-induced efficiencies, if the merger participants are able to export the extra output to foreign markets, then domestic consumers suffer higher prices as a result of the merger.

When signing an RTA, a given country should, therefore, take into consideration the proportion of assets owned by MNEs not only in that country itself but also in the other potential RTA members. One of the key benefits to a country from signing an RTA is increased consumer surplus. If, however, the RTA is accompanied by an acquisition wave, this benefit from signing the RTA in terms of increased consumer surplus may be mitigated or reversed. This concern becomes more urgent if the pre-liberalization asset holdings of MNEs are very asymmetric across the RTA members since an international acquisition wave is most likely to occur under these conditions.23

In particular, developing countries may lose out when signing RTAs through this channel. Preventing a spate of mergers may be particularly difficult for developing countries.

23 Other papers to study the interaction between trade and competition policies in different contexts include Barros and Cabral (1994), Head and Ries (1997), Francois and Horn (1998), Horn and Levinsohn (2001), Saggi and Yildiz (2006) and Ray Chaudhuri and Benchekroun (2012).
since they may lack strong institutions such as antitrust authorities. For example, in India, trade liberalization and liberalization of restrictions on foreign ownership of assets were implemented widely starting in 1991. However, the Competition Commission of India was only made functional since 2009. This is a legitimate concern since cross-border mergers and acquisitions in emerging markets have been rising since the 1990s (see Chari, Ouimet and Tesar, 2004; World Investment Report (UNCTAD), 2010).

There has emerged an international policy debate regarding this issue, as outlined in the OECD’s report on "Cross-Border Merger Control: Challenges for Developing and Emerging Economies" (2011). This paper contributes to this policy debate in the following way. The message of this paper is not that developing countries should not sign RTAs. Rather, this paper emphasizes that developing countries should invest in setting up the necessary institutions, including an effective antitrust authority with a clear merger policy, in order to maximize the benefits of opening up their economies to international trade. This would allow these countries to evaluate each acquisition proposed by MNEs and only allow those that benefit its consumers. Moreover, Propositions 1-5 and Result 1, together, suggest that instead of being generally concerned about the anticompetitive effects that may accompany trade liberalization, it is possible to identify specific sets of conditions, such as a sufficiently unequal distribution of MNEs’ asset holdings across itself and its trading partners at the time of liberalization, and sufficiently large residual demands faced by the MNEs in foreign markets, which are of more concern than others.

It is noted that an acquisition wave, triggered by an RTA, would also affect the non-members to the RTA, unless the non-members do not engage in any trade with the RTA. The effect on the non-members would depend on the volume of acquisitions that are realized in the wake of the RTA, which in turn depends on factors such as the international distribution of pre-liberalization asset holdings of MNEs, and cost and demand parameters. If the acquisitions were restricted to the RTA members, by Lemma 2, the non-members would benefit from cheaper imports resulting from the cost-savings arising due to the acquisitions and, hence, increased consumer surplus. If, on the other hand, the acquisition wave spilled over to the non-member countries, their consumer surplus may decrease.

To sum up, in order to decide whether to join an RTA, a country must compare its ensuing welfare levels as a member and as a non-member. This paper emphasizes that, when making this decision, the country must take into account that a possible by-product
of the RTA might be an acquisition wave, regardless of its unilateral decision to join the RTA. The paper also identifies a set of conditions that help countries to predict whether an acquisition wave will indeed accompany the implementation of the RTA based on the pre-liberalization distribution of MNEs’ asset holdings and the size of the residual demands faced by MNEs in foreign markets, and what the ramifications of the wave are for consumer surplus depending on its choice of whether to join the RTA.

7 Discussion

In this section, I discuss whether relaxing some of the assumptions of the model would affect the main results of this paper. Note that, at the heart of the acquisition wave mechanism, within the context of this model, lies Lemma 2. Thus, as long as Lemma 2 holds, so do most of the results derived in this paper.

It is straightforward to extend Lemma 2 and the propositions to the case where the industry structure is oligopolistic rather than a dominant firm facing fringe firms. For example, Lemma 2 applies when the MNE and the other firms behave as Cournot oligopolists and may also apply to cases of Bertrand competition with differentiated products amongst the MNE and its rivals depending on additional conditions regarding the number of varieties produced after the acquisition (see, for example, Ray Chaudhuri, 2014). Lemma 2 also extends to cases where the rivals of the MNE in the two countries do export but each of their export volumes before they are acquired is sufficiently lower than that per unit of asset originally owned by the MNE due to factors exogenous to the model. Thus, Propositions 1-5 may hold in these alternative settings.

Given that the fringe firms are price takers, I have assumed a strictly convex and increasing cost function, which is a standard assumption in the related literature (see, for example, Perry and Porter, 1985; Kamien and Zang, 1991). For other market structures, such as a Cournot oligopoly, the mechanism described in this paper may also operate similarly for other cost structures which lead to synergies from acquisitions. More specifically, as long as acquiring assets results in a lower marginal cost of production for the MNE, Lemma 2 results.

In the presence of multiple MNEs, a wave of acquisitions may be thwarted by a lack of coordination amongst the MNEs. That is, each MNE may prefer to wait for another to be
the first to acquire assets since the subsequent round of acquisitions would be less expensive, as per Corollary 1. However, as long as there exists one MNE with significantly higher asset holdings in any one market than the other MNEs, this MNE would have a greater incentive than the others to make the first acquisition. Thus, asymmetry across MNEs in terms of initial asset holdings in at least one of the countries may resolve this coordination problem.

Also in the presence of multiple MNEs, the MNEs may compete with each other to acquire the fringe firms, bidding up their price and countering the effect of Lemma 2 on the price that local owners are willing to accept to sell out (see, for example, Norbäck and Persson, 2007, and Toxvaerd, 2008, for models of endogenous acquisitions with multiple acquirers). However, such competition amongst acquirers would occur both under a scenario with high tariffs and symmetric initial asset holdings of the MNEs internationally and one with low tariffs and asymmetric initial asset holdings. Thus, when these two scenarios are compared, similar results hold as per Propositions 1-5.

8 Conclusion

This paper contributes to the literature linking trade liberalization and the increased volume of international merger activity that has been observed since the late 1980’s. It develops a theoretical framework in order to examine the role played by the distribution of pre-liberalization asset holdings of the MNE across different segmented markets in inducing acquisition waves in the face of trade liberalization.

In order to focus on the roles played by trade liberalization and the distribution of pre-liberalization asset holdings of MNEs, I have abstracted away from several industry-specific factors that may be important in explaining merger activity in certain industries. For example, MNEs in the pharmaceutical industry often acquire local generic firms upon the termination of key patents. I have also abstracted away from the fact that the degree of market power that MNEs can exercise in a globalized market is to some extent determined by the degree to which their intellectual property rights are protected (see, for example, Saggi, 2013), which has especially been a concern when serving markets in developing countries. From the developing countries’ perspective, there may arise positive spillovers from the superior technologies introduced by MNEs which mitigate the negative welfare implications of monopolization of industries through acquisitions undertaken by MNEs.
Given these caveats, the main finding of this paper is that the more asymmetric the initial asset holdings of the MNE across the multiple segmented markets, the more likely that trade liberalization induces the MNE to undertake domestic acquisitions in its home market. If the residual demand faced by the MNE is sufficiently large in foreign markets, then these domestic acquisitions may lead to cross-border acquisitions. This is in line with stylized facts regarding the volumes of domestic and cross-border M&A volumes over the past three decades, as documented in the paper. It is also shown that such mergers may raise product prices and harm consumers, thereby mitigating or reversing the benefits of trade liberalization. The ensuing policy implication is that countries, especially developing countries that lack effective merger policies, should carefully consider the existing pattern of asset holdings of MNEs and the size of residual demand faced by the MNEs across countries when deciding whether to enter into free trade agreements.

At the same time, the paper also emphasizes that it is possible to identify conditions under which trade liberalization is less likely to induce merger waves. The paper uses an example to illustrate that if, in the countries undergoing trade liberalization, the MNE’s pre-liberalization asset holdings are sufficiently symmetric, the MNE may sell-off its assets to local firms with less market power, despite trade liberalization.

Appendix:

A. Proof of Lemma 1

The first order condition associated with the fringe firms’ problem (4) in Stage 2 in country $i$ is given by:

$$P_i(Q_i) - c'(y_i) = 0$$  \hspace{1cm} (A.1)

i.e. price equals marginal cost. The first order condition associated with the MNE’s problem (5) in Stage 2 with respect to $q_{AA}$ is given by:

$$s_A P_A(Q_A) + (s_A q_{AA} + s_B q_{BA}) P'_A(Q_A) \frac{\partial Q_A}{\partial q_{AA}} - s_A c'(q_{AA} + q_{AB}) = 0$$

Equivalently,

$$MR_{AA} - c'(q_{AA} + q_{AB}) = 0$$
where
\[ MR_{AA} = P_A(Q_A) + \frac{1}{s_A} (s_A q_{AA} + s_B q_{BA}) P'_A(Q_A) \left( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right) \] (A.2)

with \( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} > 0 \). Recall that \( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} = \frac{\partial Q_A}{\partial q_{AA}} \). Assume contradictorily that \( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \) is non-positive. This implies that as the MNE increases sales in \( A \), total sales in \( A \) does not increase. Thus price of the product in \( A \) does not fall and the fringe …rms do not contract their outputs. However, together with the fact that the MNE is increasing sales in \( A \), this implies that total sales in \( A \) is increasing, which yields a contradiction. Therefore, it must be the case that \( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} > 0 \).

Since \( s_A + f_A \frac{\partial y_A}{\partial q_{AA}} > 0 \) and \( P'_A(Q_A) < 0 \), from (A.2) it follows that the MNE with either \( 0 < s_A < 1 \) or \( 0 < s_B < 1 \) or both, has \( MR_{AA} < p_A \), and hence \( q_{AA} < y_A \). The method for showing \( q_{BA} < y_A, q_{AB} < y_B \) and \( q_{BB} < y_B \), as stated in Lemma 1, is very similar to that presented above.

**B. Proof of Lemma 2**

Let the fringe policy functions, implicitly defined by (A.1), be denoted by \( \tilde{y}_i (q_{AA}, q_{BA}, s_A, s_B, f_B) \) for \( i = A, B \). Henceforth, the arguments of \( \tilde{y}_i \) will not be mentioned for notational convenience. That is, \( \tilde{y}_i \) satisfies the following:

\[ P_i(Q_i) - c'(y_i) = 0 \] (B.1)

For \( A \), we have:

\[ Q_A = s_A q_{AA} + s_B q_{BA} + (1 - s_A - s_B - f_B) y_A \] (B.2)

Differentiating (B.1) with respect to \( s_A \), we have the following:

\[ \frac{\partial P_A}{\partial Q_A} \frac{\partial Q_A}{\partial s_A} - \frac{\partial c'(y_A)}{\partial y_A} \frac{\partial y_A}{\partial s_A} = 0 \]

This, together with (B.2) implies the following:

\[ P'_A \left( q_{AA} + (1 - s_A - s_B - f_B) \frac{\partial y_A}{\partial s_A} - y_A \right) - c'' \frac{\partial y_A}{\partial s_A} = 0 \] (B.3)
Re-arranging (B.3), we get the following:

\[ P_A' (q_{AA} - y) = (-P_A' (1 - s_A - s_B - f_B) + c') \frac{\partial y_A}{\partial s_A} \]

It follows that:

\[ \frac{\partial y_A}{\partial s_A} = \frac{(q_{AA} - y) P_A'}{c' - (1 - s_A - s_B - f_B) P_A'} \] (B.4)

From Lemma 1, it follows that \((q_{AA} - y_A) < 0\), which implies that \(\frac{\partial y_A}{\partial s_A} > 0\) and hence \(\frac{\partial p_A}{\partial s_A} > 0\). Assume contradictorily that \(\frac{\partial p_A}{\partial s_A} \leq 0\), that is, an increase in \(s_A\) implies that \(p_A\) decreases. Given that the fringe firms are price takers, in response to the decrease in \(p_A\), fringe firms in \(A\) would decrease output, which contradicts (B.4). Therefore, it must be the case that \(\frac{\partial p_A}{\partial s_A} > 0\).

For \(B\), we have:

\[ Q_B = s_B q_{BB} + s_A q_{AB} + f_B y_B \] (B.5)

Differentiating (B.1) with respect to \(s_A\), we have the following:

\[ \frac{\partial P_B}{\partial Q_B} \frac{\partial Q_B}{\partial s_A} - \frac{\partial (y_B)'}{\partial y_B} \frac{\partial y_B}{\partial s_A} = 0 \]

This, together with (B.5) implies the following:

\[ P_B' \left( q_{AB} + f_B \frac{\partial y_B}{\partial s_A} \right) - c' \frac{\partial y_B}{\partial s_A} = 0 \]

It follows that:

\[ \frac{\partial y_B}{\partial s_A} = \frac{q_{AB} P_B'}{c' - f_B P_B'} < 0 \] (B.6)

Since \(P_B' < 0\), it follows that (B.6) is negative. By similar reasoning to that used to determine the sign of \(\frac{\partial p_A}{\partial s_A}\), it may be shown that \(\frac{\partial p_B}{\partial s_A} < 0\), given (B.6)

**C. Proof of Corollary 1**

We have that \(\frac{\partial \pi_i}{\partial s_i} = \frac{\partial \pi_i}{\partial p_i} \frac{\partial p_i}{\partial s_i}\). From Lemma 2, it follows that \(\frac{\partial p_i}{\partial s_i} > 0\). As \(p_i\) increases, ceteris paribus, each price-taking fringe firm would earn strictly greater profit if it chose to hold constant its output level. Therefore, any endogenous changes in the output level implemented by the profit-maximizing fringe firm in response to the increase in \(p_i\) must increase \(\pi_i\). Thus, we have \(\frac{\partial \pi_i}{\partial p_i} > 0\). This, together with Lemma 2 implies that \(\frac{\partial \pi_i}{\partial s_i} > 0\), for \(i \in \{A, B\}\). We
have that $\frac{\partial \pi_i}{\partial \sigma_i} = \frac{\partial \pi_j}{\partial \sigma_j} \frac{\partial \pi_j}{\partial \sigma_i}$. From Lemma 2, it follows that $\frac{\partial \pi_j}{\partial \sigma_j} < 0$. Since $\frac{\partial \pi_i}{\partial \sigma_j} > 0$, this, together with Lemma 2 implies that $\frac{\partial \pi_i}{\partial \sigma_i} < 0$ ■

References


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