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**ACQUISITIONS BY MULTINATIONALS AND
TRADE LIBERALIZATION**

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Acquisitions by multinationals and trade liberalization*

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Abstract

This paper develops a theoretical framework where a multinational firm (MNE) is allowed to acquire or sell a productive asset in multiple segmented asset markets. The asset is used to produce a final good which can be sold in multiple countries, with segmented product markets, undergoing trade liberalization. I explicitly model the asset markets as well as the product markets. The paper identifies initial conditions in terms of the MNE's pre-liberalization asset holdings across different segmented markets as a crucial factor for determining whether merger waves are triggered by trade liberalization. The more asymmetric the pre-liberalization asset holdings of the MNE across the multiple segmented markets, the more likely that trade liberalization induces an international merger wave that may harm consumers by raising product prices in multiple markets.

JEL classifications: F23, L12, L41, F13

Keywords: acquisitions, multinational firms, endogenous mergers, cross-border mergers, trade liberalization

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1 Introduction

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. The MNE initially holds different amounts of the productive asset in each country. 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. The aim of the paper is to derive the relationship between the MNE's initial distribution of asset holdings across countries and the acquisitions and/or sell-offs undertaken in each country by the MNE when faced with trade liberalization.¹ 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.

In an increasingly globalized world, the decision of how best to allocate their holdings of productive assets internationally is one of the key challenges facing firms. Consider 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?

These questions gain importance in light of the following empirical observations. First, there has been a proliferation of free trade agreements in recent years. Regional trade agreements (RTAs) have become increasingly prevalent since the early 1990s. According to WTO, as of January 2013, some 546 notifications of RTAs had been received by the GATT/WTO. Of these, 354 were in force. 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)

¹In this paper, the terms "merger" and "acquisition" are used interchangeably.

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. Second, there is evidence that trade liberalization has been a causal factor behind the increased volume of mergers and acquisitions that occurred in the EU in the early 1990's (see Coeurdacier, de Santis and Aviat, 2009; European Commission, 1996), in North America (Breinlich, 2008) and worldwide (Brakman, Garretsen and van Marrewijk, 2006; Brakman et al, 2013; Erel, Liao and Weisbach, 2012; Evenett, 2004; Hijzen, Gorg and Manchin, 2008). Third, in several of those industries which have had the highest volumes of mergers and acquisitions, such as financial services and pharmaceuticals, this activity has been driven by large MNEs which already owned production facilities in multiple countries when trade treaties were implemented. Consider, for example, the impending Comprehensive Economic and Trade Agreement (CETA) between Canada and EU. Prior to the implementation of CETA, several Canadian MNEs already hold productive assets in EU (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).

Most existing studies that examine the choices made by MNEs treat cross-border mergers and acquisitions 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). The focus, in most of these papers is on determining the conditions under which cross-border mergers are the preferred mode of entry to greenfield foreign direct investment. By treating cross-border acquisitions as a means of accessing a new market, these papers ignore 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. I contribute to this literature by explicitly modeling the markets for the productive asset along with the final goods markets. Within each country's asset market, I allow the MNE to not only acquire assets but to also sell existing holdings of assets if it so chooses, thereby generating new insights. I show that the existing pattern of asset holdings of the MNE across different countries at the time when trade liberalization occurs, plays a crucial role in determining the acquisition and sell-off decisions made by the MNE.

This paper 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 (Bencheikroun 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). Others focus on labour market effects (Lommerud, Straume and Sorgard, 2006; Straume, 2003), tax advantages (Norbäck, Persson and Vlachos, 2009) and access to information (Bertrand and Zitouna, 2006; Das and Sengupta, 2001; Qiu and Zhou, 2006) arising from cross-border mergers. This paper contributes to this literature by identifying 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.

This paper is more closely related to those that model the mechanism by which firms acquire productive assets from others and that endogenize the price of acquisitions (Faulli-Oller, 2000; Kamien and Zhang, 1990, 1991, 1993; Gowrisankaran and Holmes, 2004). These papers are restricted to a single integrated market which is equivalent to a closed economy setting. By contrast, in this paper, both the asset markets and the final goods markets are assumed to be segmented across multiple countries. 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).² 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. Therefore, the framework developed in this paper allows asset and final goods prices to differ in equilibrium across countries, which, I show,

² Atkeson and Burstein (2008) use aggregate price data from exporting manufacturing firms in the US, the UK, Japan, Germany, France, Italy and Canada for the period 1985-2006. Knetter (1989, 1993) uses the annual value and quantity of exports to selected destination countries for a number of seven-digit industries in four source countries: the US, the UK, Japan, and Germany, for the period 1975-1987.

has implications for the acquisition and sell-off decisions of the MNE not captured by the existing literature.

There are two key components within the theoretical framework developed in this paper that differentiate it from most other theoretical models of cross-border mergers. First, in this paper, the MNE already owns productive assets in different countries when faced with trade liberalization. Second, the MNE is allowed to sell assets to other firms in addition to being allowed to acquire assets from other firms. I then use this framework to address a set of questions that is novel relative to the existing literature:

- (i) In the face of trade liberalization, how do the acquisition and sell-off decisions of the MNE depend on its pre-liberalization holdings of productive assets internationally?
- (ii) Under what conditions, in terms of the pre-liberalization distribution of the MNE's productive assets, does trade liberalization trigger merger waves?

This framework has important implications for our understanding of international trade and investment.

I show that trade liberalization is more likely to initiate a wave of acquisitions the more asymmetric the MNE's pre-liberalization holdings of the productive asset across countries. Interestingly, if the MNE's existing asset holdings are sufficiently symmetric across countries, the MNE may prefer to sell-off assets in at least one of the countries.

There is evidence that mergers and acquisitions occur in waves and that within a wave, they strongly cluster by industry (see, for example, Andrade, Mitchell and Stafford, 2001). Those papers that examine whether trade liberalization has been a causal factor behind increasing merger volumes (Brakman, Garretsen and van Marrewijk, 2006; Brakman et al, 2013; Breinlich, 2008; Coeurdacier, de Santis and Aviat, 2009; Erel, Liao and Weisbach, 2012; European Commission, 1996) have not taken into account the implications of the distribution of large MNEs' pre-liberalization asset holdings across countries. The findings of this paper show that, in theory, whether a merger wave will be realized in response to trade liberalization depends crucially on MNEs' pre-liberalization distribution of asset holdings across countries. Thus, this paper generates more nuanced testable predictions about the impact of trade liberalization on merger waves.

This paper also has 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 the model. Section 3 analyzes the MNE's acquisition and sell-off decisions in the presence of trade liberalization. Section 4 discusses the policy implications. Section 5 discusses whether the main results derived using this theoretical framework carry over to alternate scenarios. Section 6 concludes.

2 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. The fringe firms cannot export.³ All firms produce a homogenous product. One of the inputs required in the production process is an industry-specific asset.⁴ 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 "0" represents initial values, that is, endowments

³I assume that the MNE is the only firm with market power. This simplifies the analysis while maintaining a structure that can address the fundamental question. 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.

Moreover, there do exist local firms in many industries. 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 Section 5, I briefly discuss conditions under which the main results carry over to cases where multiple firms have market power and where all firms can export.

⁴This 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.

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 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 π_A (π_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 π_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 π_i .

Starting with endowments s_A^0 and s_B^0 , during Stage 1, the MNE chooses s_A and s_B to solve the following optimization problem:

$$\max_{s_A, s_B} V \equiv s_A (v_{AA} + v_{AB}) + s_B (v_{BA} + v_{BB}) - (s_A - s_A^0)(\pi_A) - (s_B - s_B^0)(\pi_B) \quad (1)$$

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 $s_i - s_i^0$ for $i = A, B$, may be positive or negative. If $s_i - s_i^0 > (<) 0$, the MNE acquires (sells) the asset in country i . The third (fourth) term 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 (B).

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

product where $c(q)$ is strictly convex and strictly increasing, and $c'(0) = 0$.⁵ Note that this cost structure is not consistent with economies of scale. It is well understood that in the presence of economies of scale, tariff reductions would result in the MNE consolidating its assets in one country and exporting to the other. Therefore, in order to focus on other factors driving the MNE's decisions regarding acquisitions and sell-offs in the face of trade liberalization, I abstract away from economies of scale.

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:

$$Q_A = s_A q_{AA} + s_B q_{BA} + f_A y_A \quad (2)$$

$$Q_B = s_B q_{BB} + s_A q_{AB} + (1 - s_A - s_B - f_A) y_B \quad (3)$$

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:

$$\max_{y_i} p_i y_i - c(y_i) \quad (4)$$

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

⁵A 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 5 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 5.

optimization problem:

$$\max_{q_{AA}, q_{AB}, q_{BA}, q_{BB}} \begin{cases} P_A(q_{AA}, q_{BA}) q_{AA} + (P_B(q_{AB}, q_{BB}) - t_B) q_{AB} - c(q_{AA} + q_{AB}) \\ + (P_A(q_{AA}, q_{BA}) - t_A) q_{BA} + P_B(q_{AB}, q_{BB}) q_{BB} - c(q_{BA} + q_{BB}) \end{cases} \quad (5)$$

3 MNE's acquisition and sell-off decisions

This section begins by discussing the factors driving the MNE's acquisition and sell-off decisions at any given tariff level, followed by an analysis of the effect of trade liberalization.

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 marginal net benefit from acquiring the asset in country i is given by:

$$\frac{\partial V}{\partial s_i} = X_i - (s_i - s_i^0) \frac{\partial \pi_i}{\partial s_i} - (s_j - s_j^0) \frac{\partial \pi_j}{\partial s_i}, \quad i, j \in \{A, B\} \quad (6)$$

where

$$X_i \equiv v_{ii} - \pi_i + v_{ij} + s_i \frac{\partial (v_{ii} + v_{ij})}{\partial s_i} + s_j \frac{\partial (v_{ji} + v_{jj})}{\partial s_i}, \quad i, j \in \{A, B\} \quad (7)$$

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 π_i and π_j respectively.

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 $s_j \frac{\partial(v_{ji}+v_{jj})}{\partial s_i}$ capture a combination of increased market power and synergies 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 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 2.⁶ Effectively, acquisitions in country i cause the MNE to produce more in country i and increase the volume of exports to country j .

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.

The acquisition wave mechanism

Within the context of this model, an "international acquisition wave" is said to be realized when the MNE acquires assets in both the countries. 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.

⁶The impact of an acquisition in one country on the product prices in both countries, as stated by Lemma 2, also carries over to oligopolistic industries, as shown by Ray Chaudhuri (forthcoming).

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 1: *At any given non-prohibitive tariff level, an international acquisition wave is more likely to occur the less symmetric the MNE's initial asset holdings across the countries, that is, the larger is $(s_i^0 - s_j^0)$ for $i, j \in \{A, B\}$.*

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

$$\frac{\partial^2 V}{\partial s_i \partial s_i^0} = \frac{\partial \pi_i}{\partial s_i} > 0 \quad (8)$$

$$\frac{\partial^2 V}{\partial s_i \partial s_j^0} = \frac{\partial \pi_j}{\partial s_i} < 0 \quad (9)$$

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_i^0 and decreasing in s_j^0 . It follows that $\frac{\partial V}{\partial s_i}$ is greater the less symmetric the MNE's initial asset holdings across the countries, s_A^0 and s_B^0 . The greater is $\frac{\partial V}{\partial s_i}$, the greater the amount of assets acquired in country i , ceteris paribus. The greater the amount of assets acquired in country i , the greater the reduction in the MNE's marginal cost of production, and the greater the exports to country j in Stage2. Given that the fringe firms in country j are forward-looking, the greater the exports to country j subsequent to the acquisitions in country i , the lower the reservation price of each fringe firm in country j , that is, the cheaper the cost of acquiring firms in country j ■

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_i^0 , 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_i^0 .

The intuition behind (9) is as follows. The greater is s_j^0 , 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_j^0 is low,

the MNE exports this additional output to country j . If s_j^0 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_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 . Together, (8) and (9) imply that the more asymmetric the MNE's initial asset holdings across countries, the more likely that an acquisition wave is triggered, as stated in Proposition 1.

PROPOSITION 2: *For any combination of s_A^0 and s_B^0 , an international acquisition wave is more likely to occur the lower are the tariff levels, t_A and t_B .*

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

$$(P_j(Q_j) - t_j) s_i + (s_i q_{ij} + s_j q_{jj}) P'_j(Q_j) \frac{\partial Q_j}{\partial q_{ij}} - s_i c'(q_{ii} + q_{ij}) = 0 \quad (10)$$

Differentiating (10) with respect to t_j and rearranging, it can be shown that $\frac{\partial q_{ij}}{\partial t_j} < 0$. Similarly, we have $\frac{\partial q_{ji}}{\partial t_i} < 0$. 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. This, in turn, implies that the lower the tariff level, the larger is $\left| \frac{\partial \pi_j}{\partial s_i} \right|$ for $i, j \in \{A, B\}$. This facilitates the acquisition wave mechanism, and Proposition 2 follows ■

To summarize, Proposition 1 states that, holding tariff levels constant, an acquisition wave is more likely to occur if the MNE's initial asset holdings are asymmetric across countries. Proposition 2 states that, holding the MNE's initial asset holdings constant, an acquisition wave is more likely to occur in the face of trade liberalization.⁷ Together, Propositions 1 and 2 imply that an acquisition wave is most likely to occur in the face of trade liberalization when the MNE's initial asset holdings are asymmetric across countries.

PROPOSITION 3: *Trade liberalization is more likely to trigger an international acquisition wave the larger is $(s_i^0 - s_j^0)$ for $i, j \in \{A, B\}$.*

PROOF: Proposition 3 follows directly from Propositions 1-2 ■

⁷Bjorvatn (2004) is another paper to examine the effect of trade liberalization on the reservation price of target firms, but does not examine the interaction of acquisitions across 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 N . Let $M \subseteq N$ 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.

PROPOSITION 4: *An international acquisition wave is more likely to occur the less symmetric the MNE's initial asset holdings across the countries, that is, the larger is $(s_D^0 - \min s_i^0)$ for $i \in N$.*

PROOF: It is straightforward to show that Lemma 2 extends to the case with more than 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 ■

Thus Proposition 1 extends to the case with more than two countries. The same holds for Proposition 2, as shown by Proposition 5.

PROPOSITION 5: *The volume of acquisitions undertaken by the MNE is greater in country $i \neq D$ if $D, i \in M$ instead of either $i \in N - M$ or $D \in N - M$ or both.*

PROOF: More 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 facilitates the acquisition wave mechanism within these countries by cheapening their assets subsequent to acquisitions in D more than in the non-member countries. The reasoning behind this is similar to that provided in the proof of Proposition 2 ■

Together, Propositions 4 and 5 imply Proposition 6.

PROPOSITION 6: *The RTA is more likely to trigger an international acquisition wave the larger is $(s_D^0 - \min s_i^0)$ and if $D \in M$.*

PROOF: Proposition 6 follows directly from Propositions 4 and 5 ■

Propositions 1-6 highlight the main contribution of the paper by identifying the conditions most conducive to a wave of acquisitions. 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.

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 $s_i^0 \in [0, 0.5]$ 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, $\tilde{s}_A(s_A^0, s_B^0)$ and $\tilde{s}_B(s_A^0, s_B^0)$, for different tariff levels.

The effect of trade liberalization on the acquisition and sell-off decisions of the MNE are illustrated by Figures 1-2, which show a cross section of the functions $\tilde{s}_A(s_A^0, s_B^0)$ and $\tilde{s}_B(s_A^0, s_B^0)$ at $s_B^0 = 0.1$ for different values of t . Similar patterns of acquisition and sell-off decisions are observed for other values of s_B^0 .

In Figures 1-2, 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 $\hat{s}_A^0 \in [0, 0.5]$ such that an international acquisition wave is realized if $s_A^0 > \hat{s}_A^0$, with $\hat{s}_A^0$ increasing in the tariff level.*

Result 1 is consistent with Propositions 1-3. 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 $\frac{\partial^2 V}{\partial s_i \partial s_i^0} > 0$, as shown in the proof of Proposition 1. In line with Proposition 2, trade liberalization causes the threshold value of s_A^0 beyond which the acquisition wave across both countries is triggered, $\hat{s}_A^0$, to decrease.

Figures 1-2 illustrate that the lower the tariff level, the greater the volume of acquisitions in both countries, for any s_A^0 . Figure 2 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 1-6 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 2, 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, π_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 1. 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.

4 Policy Implications

The importance of the results obtained in the previous section 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 increases in response to acquisitions within that country and decreases 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 across all countries. This is the case in Example 1, which uses linear demand and quadratic cost functions.

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.⁸

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 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

⁸Other papers to study the interaction between trade and competition policies in different contexts include Francois and Horn (1998), Horn and Levinsohn (2001), Ray Chaudhuri and Benchebroun (2012), Saggi and Yildiz (2006).

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 3, 6 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, 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 what the ramifications of the wave are for consumer surplus depending on its choice of whether to join the RTA.

5 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 2.⁹ 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, forthcoming). 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 1-6 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 Zhang, 1991). For other market structures, such as a Cournot oligopoly, the acquisition wave mechanism, as 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 is satisfied. Consequently, the acquisition wave mechanism, as described in this paper, holds and, therefore, so do Propositions 1-6.

In the presence of multiple MNEs, the acquisition wave 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

⁹Recall that Lemma 2 states that a given set of acquisitions in one country can decrease consumer surplus in one market and simultaneously increase consumer surplus in another. Alternative theoretical frameworks that lead to a similar result are provided by Barros and Cabral (1994) and Breinlich, Nocke and Schutz (2013).

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 1-6.

6 Conclusion

This paper contributes to the literature linking trade liberalization and the increased volume of international merger activity that has been observed since the 1990'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 a merger wave. 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 pattern of asset holdings of MNEs 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 does not 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:

I. Proof of Lemma 1

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

$$P_i(Q_i) - c'(y_i) = 0 \quad (11)$$

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

$$MR_{AA} = P_A(Q_A) + \frac{1}{s_A} (s_A q_{AA} + s_B q_{BA}) P'_A(Q_A) \left(s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right)$$

with $\left(s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right) > 0$. Recall that $\left(s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right) = \frac{\partial Q_A}{\partial q_{AA}}$. Assume contradictorily that $\left(s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right)$ 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 firms 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 $\left(s_A + f_A \frac{\partial y_A}{\partial q_{AA}} \right) > 0$.

Thus, 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 ■

II. Proof of Lemma 2

Let the fringe policy functions, implicitly defined by (11), be denoted by $\tilde{y}_i(q_{AA}, q_{BA}, s_A, s_B, f_A)$ for $i = A, B$. Expanding (11), and differentiating yields the following:

$$\frac{\partial \tilde{y}_A}{\partial s_A} = \frac{(q_{AA} - y_A) P'_A}{c'' - (1 - s_A - s_B - f_B) P'_A} > 0 \quad (12)$$

$$\frac{\partial \tilde{y}_B}{\partial s_A} = \frac{q_{AB} P'_B}{c'' - f_B P'_B} < 0 \quad (13)$$

From Lemma 1, it follows that $(q_{AA} - y_A) < 0$, which implies that $\frac{\partial \tilde{y}_A}{\partial s_A} > 0$ 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 (12). Therefore, it must be the case that $\frac{\partial p_A}{\partial s_A} > 0$. By similar reasoning, it may be shown that $\frac{\partial p_B}{\partial s_A} < 0$, given (13) ■

III. 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 π_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 $\frac{\partial \pi_j}{\partial s_i} = \frac{\partial \pi_j}{\partial p_j} \frac{\partial p_j}{\partial s_i}$. From Lemma 2, it follows that $\frac{\partial p_j}{\partial s_i} < 0$. Since $\frac{\partial \pi_j}{\partial p_j} > 0$, this, together with Lemma 2 implies that $\frac{\partial \pi_j}{\partial s_i} < 0$ ■

References

- Anand, J. and A. Delios, 2002, "Absolute and relative resources as determinants of international acquisitions," *Strategic Management Journal*, 23, 119-34.
- Andrade, G., M. Mitchell and E. Stafford, 2001, "New evidence and perspectives on mergers," *Journal of Economic Perspectives*, 15, 103-20.
- Atkeson, A. and A.T. Burstein, 2008, "Pricing-to-Market, Trade Costs, and International Relative Prices," *American Economic Review*, 98, 1998-2031.
- Barba-Navaretti, G., A.J. Venables, F.G. Barry, K. Ekholm, A.M. Falzoni, J.I. Haaland, K.H. Midelfart and A. Turrini, 2004, *Multinational Firms in the World Economy* (Princeton University Press, Princeton).

- Barros, P.P. and L. Cabral, 1994, "Merger Policy in Open Economies," *European Economic Review*, 38, 1041-55.
- Benchenkroun, H. and A. Ray Chaudhuri, 2006, "Trade Liberalization and the Profitability of Mergers: A Global Analysis," *Review of International Economics*, 14, 941-57.
- Bertrand, O. and H. Zitouna, 2006, "Trade Liberalization and Industrial Restructuring: The Role of Cross-Border Mergers and Acquisitions," *Journal of Economics & Management Strategy*, 15 (2), 479–515.
- Bernard, A.B., J.B. Jensen, S.J. Redding and P.K. Schott, 2007, "Firms in International Trade," *Journal of Economic Perspectives*, 21, 105–130.
- Bjorvatn, K., 2004, "Economic integration and the profitability of cross-border mergers and acquisitions," *European Economic Review*, 48(6), 1211-26.
- Brakman, S., H. Garretsen, C. van Marrewijk and A. van Witteloostuijn, 2013, "Cross-border mergers and acquisition activity and revealed comparative advantage in manufacturing industries," *Journal of Economics and Management Strategy*, 22, 28-57.
- Brakman, S., Garretsen, H. and van Marrewijk, C., 2006, "Cross-Border Mergers and Acquisitions: The Facts as a Guide for International Economics," CESifo Working Paper No. 1823, Munich.
- Breinlich, H., 2008, "Trade Liberalization and Industrial Restructuring Through Mergers and Acquisitions," *Journal of International Economics*, 76, pp. 254-66.
- Breinlich, H., V. Nocke and N. Schutz, 2013, "Cross-border price effects of mergers and acquisitions - a quantitative framework for competition policy," Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Mergers and Competition Policy B13-V3.
- Caves, R.E., 1996, *Multinational enterprises and economic analysis* (Cambridge University Press, Cambridge).
- Chari, A., P.P.Ouimet and L.L. Tesar, 2004, "Acquiring Control in Emerging Markets: Evidence from the Stock Market," NBER Working Papers 10872.
- Coeurdacier, N., R.A. De Santis, A. Aviat, "Cross-border mergers and acquisitions: financial and institutional forces," 2009, European Central Bank, Working paper No. 1018.
- Das, S.P. and S. Sengupta, 2001, "Asymmetric Information, Bargaining, and International Mergers," *Journal of Economics & Management Strategy*, 10, 565-90.
- Erel, I., R.C. Liao and M.S. Weisbach, "Determinants of Cross-Border Mergers and Acqui-

- sitions," 2012, *Journal of Finance*, LXVII, 1045-82.
- European Commission, Directorate-General for Economic and Financial Affairs, 1996, 'Economic Evaluation of the Internal Market'.
- Evenett, S., 2004, "The Cross-Border Mergers and Acquisitions Wave of the Late 1990s," NBER Chapters, in: *Challenges to Globalization: Analyzing the Economics*, National Bureau of Economic Research Inc., 411-470.
- Falvey, R., "Endogenous Mergers and Tariffs in an Integrated Market," in *Trade Theory, Analytical Models and Development: Essays in honor of Peter Lloyd*, Volume 1, Cheltenham: Edward Elgar, 2005.
- Fauli-Oller, R., 2000, "Takeover Waves," *Journal of Economics & Management Strategy*, 9, 189-210.
- Francois, J. and Horn, H., 1998, "Competition Policy in an Open Economy," Discussion Paper No. 98-092/2, Tinbergen Institute, Erasmus University, Rotterdam.
- Fumagalli, E. and Vasconcelos, H., 2009, "Sequential Cross-Border Mergers," *International Journal of Industrial Organization*, 27, 175-187.
- Gaudet, G. and R. Kanouni, 2004, "Trade Liberalization and Profitability of Domestic Mergers," *Review of International Economics* 12, 353-58.
- Gopinath, G., P.O. Gourinchas, C.T. Hsieh, and N. Li, 2011, "International Prices, Costs, and Markup Differences," *American Economic Review*, 101(6), 2450-86.
- Gowrisankaran, G. and T.J. Holmes, 2004, "Mergers and the Evolution of Industry Concentration: Results from the Dominant Firm model," *RAND Journal of Economics*, 35 (3), 561-582.
- Helpman, E., Melitz, M.J. and Yeaple, S.R., 2004, "Exports Versus FDI with Heterogeneous Firms," *American Economic Review*, 94 (1), 300-16.
- Hijzen, A., H. Gorg and M. Manchin, 2008, "Cross-border mergers and acquisitions and the role of trade costs," *European Economic Review*, 52, 849-66.
- Horn, H. and J. Levinsohn, 2001, "Merger Policies and Trade Liberalization," *Economic Journal*, 111, 244-76.
- Horn, H. and L. Persson, 2001, "The Equilibrium Ownership of an International Oligopoly," 2001, *Journal of International Economics*, 307-333.
- Kamien, M.I. and Zang, I., 1990, "The Limits of Monopolization through Acquisition," *The Quarterly Journal of Economics*, 105, pp. 465-99.

- Kamien, M.I. and Zang, I., 1991, "Competitively cost advantageous mergers and monopolization," *Games and Economic Behaviour*, 3, pp. 323-38.
- Kamien, M.I. and Zang, I., 1993, "Monopolization by sequential acquisition," *Journal of Law and Economic Organization*, 9, pp. 205-29.
- Klimenko, M. and Saggi, K., 2007, "Technical compatibility and the mode of foreign entry with network externalities," *Canadian Journal of Economics*, 40, pp. 176-206.
- Knetter, M.M., 1989, "Price Discrimination by U.S. and German Exporters," *American Economic Review*, 79, pp. 198-210.
- Knetter, M.M., 1993, "International Comparisons of Price-to-Market Behavior," *American Economic Review*, 83, pp. 473-86.
- Lommerud, K.E., O.R. Straume and L. Sorgard, 2006, "National Versus International Mergers in Unionized Oligopoly," *RAND Journal of Economics*, 37, 212-33.
- Long, N.V. and N. Vousden, 1995, "The Effects of Trade Liberalization on Cost-Reducing Horizontal Mergers," *Review of International Economics*, 3, 141-155.
- Markusen, J., 2002, *Multinational firms and the theory of international trade* (MIT Press, Cambridge).
- Mattoo, A., M. Olarreaga and K. Saggi, 2004, "Mode of foreign entry, technology transfer, and FDI policy," *Journal of Development Economics*, 75, 95-111.
- Melitz, M.J., 2003, "The impact of trade on intra-industry reallocations and aggregate industry productivity," *Econometrica*, 71, 1695-725.
- Motta, M. and G. Norman, 1996, "Does economic integration cause foreign direct investment?" *International Economic Review*, 37, 757-783.
- Neary J.P., 2007, "Cross-Border Mergers as Instruments of Comparative Advantage," *Review of Economic Studies*, 74 (4), 1229-57.
- Nocke, V. and Yeaple, S., 2007, "Cross-border mergers and acquisitions vs. greenfield foreign direct investment: The role of firm heterogeneity," *Journal of International Economics*, 72, 336-65.
- Nocke, V. and S. Yeaple, 2008, "An Assignment Theory of Foreign Direct Investment," *Review of Economic Studies*, 75, 529-57.
- Norbäck, P.J. and L. Persson, 2007, "Investment liberalization -why a restrictive cross-border merger policy can be counterproductive?" *Journal of International Economics*, 72, 366-80.
- Norbäck, P.J. and L. Persson, 2008, "Globalization and profitability of cross-border mergers

- and acquisitions," *Economic Theory*, 35(2), 241-66.
- Norbäck, P.J., L. Persson and J. Vlachos, 2009, "Cross-border acquisitions and taxes: efficiency and tax revenues," *Canadian Journal of Economics*, 42(4), 1473-500.
- Nguyen, D. and G. Schaur, 2010, "Cost Linkages Transmit Volatility Across Markets," EPRU Working Paper Series 2010-03, Economic Policy Research Unit (EPRU), University of Copenhagen.
- Perry, M.K. and R.H. Porter, 1985, "Oligopoly and the Incentive for Horizontal Merger," *American Economic Review*, 75, 219-27.
- Qiu, L. D. and W. Zhou, 2006, "International Mergers: Incentives and Welfare," *Journal of International Economics*, 68, 38-58.
- Ray Chaudhuri, A., "Cross-border mergers and market segmentation," in press, *Journal of Industrial Economics*.
- Ray Chaudhuri, A. and H. Benchebkroun, 2012, "Welfare effect of mergers and multilateral trade liberalization," *Review of International Economics*, 20, 119-33.
- Saggi, K., 2013, "Market Power in the Global Economy: the Exhaustion and Protection of Intellectual Property," *Economic Journal* 123, 131-161.
- Saggi, K. and H.M. Yildiz, 2006, "On the International Linkages between Trade and Merger Policies," *Review of International Economics* 14, 212-25.
- Straume, O.R., 2003, "International mergers and trade liberalization: implications for unionized labour," *International Journal of Industrial Organization*, 21(5), 717-35.
- Toxvaerd, F., 2008, "Strategic merger waves: A theory of musical chairs," *Journal of Economic Theory*, 140, 1-26.
- UNCTAD, World Investment Report, 2010, United Nations, New York.