Trade Liberalization and Industrial Restructuring through Mergers and Acquisitions*

(JOB MARKET PAPER)

Holger Breinlich†

September 2005

Abstract

This paper analyses mergers and acquisitions (M&A) as a previously neglected channel of industrial restructuring in the face of trade liberalization. Using the Canada-United States Free Trade Agreement of 1989 as a natural experiment, I provide empirical evidence that trade liberalization leads to significant increases in M&A activity. I also show that resources are reallocated from less to more productive firms in the process and that the amount of reallocation is quantitatively important. Taken together, these results suggest that M&A is an important firm-level alternative to the previously studied adjustment channels of establishment exit and contraction. This has strong implications for the cost-benefit analysis of trade liberalization episodes since M&A may offer a more efficient way of reallocating resources than establishment contraction and closure by low productivity firms combined with internal growth of more efficient firms.

KEY WORDS: Mergers and Acquisitions, Trade Liberalization, International Trade, CUSFTA.
JEL CLASSIFICATION: F12, F15, L2, L4.

*I am grateful to Stephen Redding, Keith Head, Anthony Venables, Henry Overman, Silvana Tenreyro and seminar participants at the London School of Economics, the NEG Spring School 2005 in Cagliari and the ETSG Meeting 2005 in Dublin for helpful comments and suggestions. All remaining errors are mine.

†London School of Economics and Centre for Economic Performance, Houghton Street, London WC2A 2AE. E-mail: h.breinlich@lse.ac.uk.

1 Introduction

Recent economic research on the effects of trade liberalization has highlighted the importance of studying the firm- and establishment-level adjustment processes triggered by freer trade (a short and incomplete list of contributions includes Tybout et al., 1991; Tybout and Westbrook, 1995; Pavcnik, 2002; and Trefler, 2004). A central insight from these studies is that a substantial part of the impact of freer trade works through a reallocation of resources at the plant- and firm-level. In particular, the contraction and exit of low productivity establishments and the expansion of more productive ones can explain a sizeable share of aggregate productivity increases found in the wake of trade liberalizations (see Pavcnik, 2002, and Trefler, 2004).

While this literature has thus demonstrated the general importance of micro-level resource reallocation in understanding the effects of freer trade, the central issue of how resources are reallocated at the firm-level is still not sufficiently well understood. In particular, only scarce attention has been paid to resource transfers through the market for corporate control, i.e. through mergers and acquisitions (M&A). This is despite the fact that M&A can in principle play a similar role in transferring resources as the establishment-level adjustment processes studied sofar: Instead of closing down establishments, reducing output or exiting altogether, firms also have the option to search for buyers interested in parts or the whole of their operations. Similarly, expanding firms have the option of buying other firms rather than expand production at existing plants or open new ones. Establishment-level studies which do not look at changes in ownership and focus on plant level contraction, exit or expansion implicitly ignore this potential margin of adjustment.[1]

The purpose of this paper is to investigate empirically whether M&A does indeed play a role in industrial restructuring in the face of trade liberalization. This is important for a number of reasons. First, studying M&A as an additional channel of adjustment is necessary to get a complete picture of the extent of resource reallocation caused by freer trade. Second, M&A is likely to be qualitatively different from the other adjustment margins in that it represents a swifter and potentially more efficient way of reallocating factors of production. Instead of workers and capital becoming unemployed for some period before being rehired, acquisitions allow for an immediate reallocation towards new ownership. Also, M&A allows the takeover of entire production structures which may be most efficient if preserved as a whole. This reallocation of control at existing establishments might indeed be part of the reason for the important within-plant increases in productivity found in many studies (e.g. Tybout and Westbrook, 1995; Pavcnik, 2002).

The particular liberalization episode I will study in this paper is the Canada-United States Free Trade Agreement (CUSFTA) of 1989. As will be argued in more detail, CUSFTA provides an ideal setting for the purpose of this study. Most importantly, it represented a clear-cut and unanticipated policy experiment which was not introduced in response to macroeconomic shocks nor accompanied by other major economic reforms. Furthermore, the main policy instrument used (tariff cuts) is easily quantifiable and shows a large variation across sectors. Finally, the large

[1] Note that throughout this paper, I will use the words "establishment" and "plant" interchangeably to denote a unit of production within a firm.

size difference between the treaty partners and the implied variation in expected responses to the integration shock further increases the potential for convincing econometric identification.

Against this background, I will present three main sets of findings. In a first step, I examine whether there is evidence that CUSFTA led to more M&A activity. Using a difference-in-differences approach, I find a substantial increase in the number of domestic Canadian transactions which is positively correlated with the magnitude of tariff cuts across sectors. There is also an effect on domestic U.S. M&A activity but one that is much less pronounced than in Canada, consistent with the idea that CUSFTA presented the bigger shock for the smaller Canadian market. Cross-border transactions show substantial changes around the implementation of CUSFTA as well, although the link to tariff cuts is not always robust. I also consider alternative explanations for my findings like changes in competition policy or industry-level trends in M&A but cannot find any evidence that such factors are driving my results. In a second step, I examine firm-level characteristics of targets and acquirers in order to investigate whether acquisitions involve a reallocation of resources from less to more productive firms, as seems to be the case for the establishment-level channels of reallocation (exit and contraction). This is indeed what I find: acquirers tend to be bigger, more profitable and more productive. In a final step, I look at the amount of output and employment reallocation in North America that was due to M&A during my sample period 1985-1997. Comparing results to reallocation via exit and contraction, I find that M&A was quantitatively important relative to these alternative channels of adjustment. Taken together, these results suggest that M&A is an important firm-level alternative to the adjustment mechanisms of establishment exit and contraction that have been analysed in previous research.

A number of recent theoretical contributions in International Trade have also studied firm-level reallocation processes triggered by trade liberalization (Melitz, 2003; Bernard et al., 2003; Bernard, Redding and Schott, 2005; and Falvey, Greenaway and Yu, 2004). Similar to the empirical literature on establishment-level reallocation by which they were motivated, however, they do not examine M&A as a form of resource transfer. Another group of papers in International Trade does look at M&A but mostly in the form of cross-border transactions and in the context of foreign direct investment (e.g. Görg, 2000; Horn and Persson, 2001; Nocke and Yeaple, 2004; di Giovanni, 2005). Rather than analysing M&A as a means of industry restructuring, they examine its role as an alternative form of foreign market access in addition to greenfield investment and exports. Bertrand and Zitouna (2005) present a model where M&A is an alternative to firm exit after a lowering of trade barriers but they also restrict their analysis to cross-border mergers. In contrast, several theoretical contributions in Industrial Organization have directly focused on M&A as a mechanism for reallocating resources between domestic firms. Dutz (1989) analyses M&A as a means of consolidation in declining industries. Jovanovic and Rousseau (2002, 2004) use models with heterogenous firms to show how M&A can serve as a complement to exit and internal adjustment to firm-specific productivity shocks. However, these contributions restrict their attention to closed-economy settings and only analyse domestic shocks.

On the empirical side, the idea that M&A can serve as an adjustment mechanism to industry-

level shocks has received support from a number of recent contributions in Corporate Finance (Mitchell and Mulherin, 1996; Mulherin and Boone, 2000; Andrade and Stafford, 2004). These studies succeed in directly linking increases in M&A activity to domestic shocks like deregulation and financial innovation. The question of whether M&A also plays a role in the industrial restructuring necessitated by trade liberalization shocks, however, has not yet been addressed in a rigorous way. While there is some descriptive and anectodal evidence to the affirmative (OECD, 2001; Chudnovsky, 2000), no clear econometric results have been presented sofar.[2] This is the gap the present contribution tries to fill.

The remainder of this paper is structured as follows. Section 2 presents a simple model of trade liberalization and resource reallocation via M&A. This section is intended to highlight the principal economic mechanisms at work and to give some guidance for the subsequent empirical analysis. Section 3 provides additional background information on CUSFTA and section 4 describes the data. Section 5 proceeds to an empirical investigation of changes in M&A activity in the wake of CUSFTA, section 6 compares characteristics of targets and acquirers and section 7 provides evidence on the quantitative importance of M&A as a form of reallocation. I conclude with a summary of findings and directions for future research (section 8).

2 Theoretical Framework

How might trade liberalization lead to reallocation via M&A? This section presents a simple model of M&A as a means of resource transfer between firms in order to illustrate a potential mechanism. The model's underlying idea is that all firms possess assets that are of interest to other firms, like specific production skills, marketing capabilities or physical capital (in the following I will simply talk of capital). Changes in demand and supply conditions will lead to changes in firm-specific demand for these assets, with expanding firms wanting to increase their stocks and contracting firms looking for potential buyers. The M&A market then provides a channel through which the necessary reallocation can take place. Against this background, I study the effect of the demand shock arising from bilateral trade liberalizations such as CUSFTA. The crucial feature of this shock is its differential effect across firms with different levels of productivity. Since a number of studies have shown that exporting is costly and requires an initial investment (Roberts and Tybout, 1997; Bernard and Jensen, 2004), only more productive firms that can afford these cost will benefit from liberalization through increased exporting opportunities. Low productivity firms, in contrast, will

[2] An earlier study by Mitchell and Mulherin (1996) and a recent working paper by Greenaway et al. (2005) present (mixed) evidence on the link between import penetration rates and M&A. However, since there is no exogenous variation in this measure of exposure to trade, it is not obvious whether their results can be interpreted in favour or against a link between trade liberalization and M&A. For example, any negative productivity shock that triggers restructuring of a given industry is likely to involve M&A (see Andrade et al., 2001). At the same time, the decline in the sector's relative productivity as compared to the rest of the world will lead to more imports and a higher import penetration rate. Such issues are reminiscent of the problems which plagued earlier studies on the link between trade and mark-ups, firm size or productivity (as discussed in Tybout, 2001, or Fernandes, 2003).

suffer lower profits due to more intense product market competition from foreign firms.[3] Thus, while exporters need additional capital in order to expand operations, non-exporters attach less value to their existing capital stock. The presence of an M&A market then allows the two parties to engage in a mutually beneficial reallocation of capital.

The model presented below tries to capture this intuition in the simplest possible framework, building on the earlier contributions by Melitz (2003) and Jovanovic and Rousseau (2002). I analyse a setting with two symmetric countries in which M&A is used to reallocate capital between firms in a monopolistically competitive sector. I start in an initial steady state equilibrium in which firms have already acquired the optimal capital stocks associated with the prevailing level of trade costs. I then shock this equilibrium by an unanticipated lowering of trade barriers which triggers a reallocation of capital via M&A from exporters to non-exporters (less productive to more productive firms).

2.1 Model Setup and Initial Equilibrium

Following Melitz (2003), I analyse a setting with two symmetric countries, home and foreign. In each country, there is one sector that produces a homogenous product A under perfect competition and constant returns to scale, requiring the input of one unit of labour for one unit of output. Good A is freely tradable and serves as the model's numeraire which implies an equilibrium wage of $w = 1$ as long as both countries produce A (which I assume in the following). My main interest, however, lies on the two economies' second sector, in which firms produce differentiated varieties under monopolistic competition.[4] Demand for the homogenous and the differentiated good is generated by standard Cobb-Douglas-CES type preferences:

$$U = A^{s_A} M^{s_M} \qquad \text{with} \quad M = \left[\int_{\gamma \varepsilon \Gamma} q(\gamma)^{\frac{\sigma-1}{\sigma}} d\gamma \right]^{\frac{\sigma}{\sigma-1}}$$

where Γ is the mass of varieties available in the differentiated goods sector (both domestically produced and imported) and $q(\gamma)$ is consumption of any given variety. Utility maximisation by consumers yields fixed expenditure shares of s_A for the numeraire good and s_M for the differentiated goods sector, where I assume that $s_A + s_M = 1$. For demand (q) and expenditure levels (r) of any variety γ within the differentiated goods sector I obtain $q(\gamma) = p(\gamma)^{-\sigma} P^{\sigma-1} s_M E$ and $r(\gamma) = p(\gamma)^{1-\sigma} P^{\sigma-1} s_M E$. In these expressions, $p(\gamma)$ is the price of variety γ, $\sigma > 1$ the elasticity of substitution between any two varieties and P the CES price index defined as $P = \left[\int_{\gamma \varepsilon \Gamma} p(\gamma)^{1-\sigma} d\gamma \right]^{\frac{1}{1-\sigma}}$. Total expenditure E consists of both aggregate profits and labour income which is equal to the size of each country's labour force, L.

I now turn to the differentiated goods sector's supply side. To simplify the analysis, I assume

[3] This differential effect of bilateral trade liberalizations across firms is also analysed in Melitz (2003). In his model, however, it is factor market competition from expanding exporters that drives results rather than product market competition from foreign firms.

[4] Having a numeraire sector with freely tradable output is not essential for this baseline model but helps to understand the various possible extensions I discuss below.

that goods in that sector are produced using non-depreciating capital (k) as the only factor of production. Firms are heterogenous in productivity levels (φ) and the amount of capital required to produce a given amount of output (q) is given by $k = \frac{q}{\varphi} + F$. This production function implies a minimum capital stock of F which firms need to acquire in order to enter the market.

Both economies are endowed with a fixed capital stock of K which is owned by the differentiated goods sector's firms. Capital is traded on an M&A market at a price of i/δ where δ is the exogenously given and time-invariant discount factor. Writing the M&A price in this way facilitates the comparison of lifetime revenues and costs needed below for the firms' optimization problem. Capital acquired on the M&A market takes on the acquirer's productivity φ after acquisition but I assume for simplicity that the target's variety cannot be used.[5] Note that it would be straightforward to allow for internal investment or a used capital market as additional channels through which firms can adjust their capital stocks. Since none of the principal findings would be changed by these extensions, however, I prefer to stick to the more tractable model outlined here.[6]

As said, I consider an initial steady state equilibrium in which no firm has an incentive to exit or enter the market or change its capital stock level. First consider determination of the optimal capital stock of active firms. With every unit of capital firms hold in addition to F, they can generate per period revenues of $p\varphi$ but face opportunity costs of i/δ since they could also offer their capital for sale on the M&A market. Since every firm is a monopolist for its variety, it chooses a price-output combination that maximises total discounted profits, given by $\pi_T = \frac{pq}{\delta} - \frac{q}{\varphi}\frac{i}{\delta} - F\frac{i}{\delta}$. The optimal levels of prices and per-period output are thus $p(\varphi) = \frac{\sigma}{\sigma-1}\frac{i}{\varphi}$ and $q(\varphi) = \left[\frac{\sigma}{\sigma-1}\frac{i}{\varphi}\right]^{-\sigma} P^{\sigma-1}s_M E$ which requires a capital stock of $k(\varphi) = \left[\frac{\sigma}{\sigma-1}i\right]^{-\sigma}\varphi^{\sigma-1}P^{\sigma-1}s_M E + F$.

Output can be sold domestically or can be exported to the foreign market. However, exporting firms incur variable "iceberg"-type trade cost, i.e. for every unit they ship only $1/\tau$ units arrive while the rest melts during transport. The corresponding export price is thus $p_x(\varphi) = \frac{\sigma}{\sigma-1}\frac{\tau i}{\varphi}$ and per-period exports are $q_x(\varphi) = \left[\frac{\sigma}{\sigma-1}\frac{\tau i}{\varphi}\right]^{-\sigma} P^{\sigma-1}s_M E$. In addition to the variable trade costs measured by τ, exporters also have to make a one time capital investment of F_x in order to serve the foreign market, yielding a capital demand for export production of $k_x(\varphi) = \left[\frac{\sigma}{\sigma-1}i\tau\right]^{-\sigma}\varphi^{\sigma-1}P^{\sigma-1}s_M E + F_x$. The investment F_x is in addition to the domestic setup capital F and can be thought of as adapting products to foreign standards, establishing local distribution networks etc. (see Roberts and Tybout, 1997).

Given active firms' optimal capital stocks, it remains to determine the set of active firms. In

[5] The assumption that productivity is owner specific is a standard way in the theoretical literature on M&A to assure profitability of mergers (e.g. Björnvatn, 2004). It is consistent with empirical observations for the U.S. that plant productivity increases after acquisitions by more productive owners and decreases if the acquirer's plants are less efficient on average (Maksimovic and Phillips, 2001). Allowing use of the target's variety would generate an additional incentive for engaging in M&A but would not qualitatively alter the impact of trade liberalization on reallocation.

[6] For example, one could introduce internal investment by allowing firms to employ labour from the numeraire sector to produce new capital. Distinguishing a market for used capital from the M&A market would be possible by introducing variable costs for adapting capital for sale (Jovanovic and Rousseau, 2002). Both additional forms of adjustment would put upper and lower bounds on the M&A price but would not eliminate reallocation via M&A in reaction to trade liberalization.

each market, there is a large number (M_e) of potential entrants. Firm productivities are initially drawn at random from a cumulative distribution $V(\varphi)$ but all firms acquire knowledge about their productivity parameter φ before entry, i.e. before acquiring the minimum capital amount F or any additional capital.[7] Thus, only those firms will produce for which the sum of discounted future operating profits given by $\left(pq - q\varphi^{-1}i\right)/\delta$ is at least equal to the setup costs Fi/δ. Similarly, only firms that can cover the fixed exporting cost $F_x i/\delta$ through future exporting profits will enter the export market. These two entry conditions can be used to obtain expressions for the threshold productivities at which production for the domestic and foreign market becomes profitable (denoted φ^* and φ_x^*, respectively). Appendix A provides the corresponding derivations and results but my interest here is on the resulting levels of capital demand for domestic and export production.

Demand for capital for domestic production ($k_d + F$) comes from all firms with $\varphi \geq \varphi^*$ while firms with $\varphi \geq \varphi_x^*$ need additional capital ($k_x + F_x$) to produce for the export market. To obtain explicit solutions for φ^*, φ_x^*, k_d, and k_x, I choose a specific distributional form for $V(\varphi)$. In line with other contributions in the heterogeneous firm literature (e.g. Melitz and Ottaviano, 2004), I let φ be Pareto-distributed, i.e. with cumulative density $V(\varphi) = 1 - \left(\frac{\kappa}{\varphi}\right)^a$, where $\kappa > 0$, $a > \sigma - 1 > 0$, and $\varphi \geq \kappa$.[8] With these assumptions, I can determine the market clearing price i and derive total capital stocks (including F and F_x) used for exporting and domestic production (see appendix A for details):

$$K_d = \int_{\varphi=\varphi^*}^{\infty} \left(k_d\left(\varphi\right) + F\right) M_e v\left(\varphi\right) d\varphi = K\left[1 + \tau^{-a}\left(\frac{F_x}{F}\right)^{\frac{\sigma-1-a}{\sigma-1}}\right]^{-1} \tag{1}$$

and

$$K_x = \int_{\varphi=\varphi_x^*}^{\infty} \left(k_x\left(\varphi\right) + F_x\right) M_e v\left(\varphi\right) d\varphi = K\left[1 + \tau^{a}\left(\frac{F_x}{F}\right)^{-\frac{\sigma-1-a}{\sigma-1}}\right]^{-1} \tag{2}$$

where $\frac{\sigma-1-a}{\sigma-1} < 0$ since by assumption $a > \sigma - 1 > 0$.

2.2 Bilateral Trade Liberalization

Now consider an unanticipated decline in variable trade costs τ. Similar to Melitz (2003), I focus on a comparison of the old and the new steady state equilibrium and in particular on the changes in capital allocation between the two equilibria. It is clear from (1) and (2) that the amount of capital used for domestic and export production will be different in the new equilibrium, with K_x increasing and K_d decreasing. Intuitively, increased presence of foreign exporters will lower revenues

[7] Introducing uncertainty of potential entrants about their future productivity levels combined with an exogenous probability of firm death as in Melitz (2003) would allow generating continuous entry and exit of firms and steady state M&A activity (in the sense that entrants with insufficient productivity would want to immediately resell their assets). However, the basic intuition of trade liberalization leading to a reshuffling of resources to more productive firms can equally well be captured in the simpler model presented here.

[8] Indirect evidence for the empirical validity of the Pareto assumption comes from the literature on firm size distributions which suggests that Pareto is a reasonable approximation there (e.g. Cabral and Mata, 2001). Since firm size (i.e. revenue) is directly proportional to productivity in my model, productivity will also be Pareto-distributed.

for local firms from production for the domestic market, implying lower returns to a firm's existing capital stock.[9] Consequently, import competing firms offer part of their capital stock for sale on the M&A market and any firm with φ below the new entry threshold φ^* will use M&A to exit the market altogether. While trade liberalization thus leads to an increase of supply in M&A capital, it also increases capital demand for export production. This is since lower costs for accessing the foreign market imply larger market shares for exporters who in turn demand additional capital. Better access to foreign markets also lowers the minimum productivity level required for profitable exporting (φ_x^*), leading to an increase in the number of exporters.

Since the total capital stock is fixed, any increase in export capital demand is offset by an equal decrease in capital demand for domestic production. Thus, the total amount of reallocation of capital into export production can be determined by differentiating either of expressions (1) or (2) with respect to τ. Opting for (1), I obtain:

$$dK_d = \frac{a\lambda K}{[1+\lambda]^2 \tau} d\tau > 0$$

where I defined $\lambda = \tau^{-a} \left(\frac{F_x}{F}\right)^{\frac{\sigma-1-a}{\sigma-1}} > 0$ as on overall measure of initial trade costs. The amount of capital reallocation is simply the absolute value of this derivative, i.e. $CR = |dK_d|$. Since a, K and τ are positive, CR can be written as:

$$CR = \frac{a\lambda K}{[1+\lambda]^2 \tau} |d\tau| \tag{3}$$

That is, the amount of resource reallocation via M&A is increasing in the magnitude of trade liberalization (as captured by $|d\tau|$).[10] Also note that capital is reallocated from non-exporters to exporters. Since the presence of fixed and variable exporting costs means that only the most productive among the active firms will export, capital is in effect transferred from less to more productive firms.[11] Finally, note that revenues (r) and per-period profits net of capital costs (that is, $\pi_T \times \delta$) are increasing functions of productivity φ in this model. This implies that acquiring firms are also larger (in terms of sales) and more profitable than targets.

[9] In the model this is reflected in a lower price index P. Note that it is increased product market competition from foreign firms that triggers the losses of domestic producers here. This is in contrast to Melitz (2003) where continuous exit and entry combined with the CES preference structure eliminates any role for import competition (it is factor market competition that drives his results).

[10] Note that interpreting the whole of CR as M&A assumes that the export and domestic production unit of a firm sell or acquire all of their capital through the M&A market. Alternatively, one could assume that exporters reallocate capital internally from domestic to export production and acquire only the shortfall on the M&A market. While this assumption considerably complicates the analysis, the principal results on which I will rely for my empirical analysis will remain unchanged: M&A is increasing in $|d\tau|$ and $|d\tau|$ enters the reallocation volume CR multiplicatively (results available from author upon request).

[11] See appendix A for a formal derivation of the productivity levels of exporters and non-exporters.

2.3 Extensions and Questions for the Empirical Analysis

The simple model just presented is sufficient to capture the central intuition that trade liberalization has asymmetric effects across firms which in turn necessitates a reallocation of resources via M&A. In view of the subsequent empirical analysis, it is however useful to be aware of whether and how the theoretical results would have to be modified in a more general setting.

First, while the model assumes two symmetric trading partners, the U.S. market is about ten times the size of the Canadian market. This suggests that trade liberalization should have a much stronger effect on M&A activity in Canada since increases in both import competition and exporting opportunities will be substantially bigger there.[12]

Second, extending the model to multiple sectors raises the possibility of diversifying or conglomerate M&A transactions that go across industry boundaries. The basic intuition of the model will still apply, however: firms want to acquire production capacity in other industries through acquisitions both because of improved exporting opportunities there or because increased import competition has made assets cheaper. This argument also makes clear that the relevant reductions in variable trade costs in such a multi-sector model are the ones facing the acquisition target. This is since an acquirer will have to use the new production capacity to produce the target industry's goods.[13]

Finally, acquisitions might also be cross-border in nature, e.g. expanding foreign exporters may want to acquire import competing domestic firms. While the decrease in the latter firms' reservation price for their assets will encourage acquisitions, there will also be a counterbalancing effects arising from tariff-jumping considerations: decreases in variable trade costs make it easier to serve the foreign market via exports and thus reduce the incentives to establish production capacity there via horizontal M&A.[14]

The second key implication that arose from the theoretical model was that reallocation will be from less to more productive firms (since exporters are more productive than non-exporters). Again, a similar prediction should hold for acquisitions across both national and industry borders since M&A will only create value for the buyer if the acquired assets can be put to a more profitable use. The productivity advantage of the acquiring firm and the ensuing selection into exporter status is what allows this increase in profitability in my model.

To summarize, the model and the discussion suggest using the following empirical analysis to address the following questions:

1. Do reductions in variable trade costs (tariff cuts) lead to more takeovers of firms in the affected

[12] This intuition can be formalised by extending the above model to asymmetric countries (at the cost of substantially increased analytical complexity). Results available from author upon request.

[13] An easy way of formalizing this intuition would be in a two sector model in which firms can use production capacity in the other sector at their own productivity level φ but first have to make an investment I to acquire the necessary sector-specific production know-how (this would be addition to F). If the productivity of an acquirer from the non-liberalizing sector is high enough to be an exporter in the liberalizing sector, a lowering of trade costs might raise his potential revenues above the threshold I and trigger entry.

[14] Both Bertrand and Zitouna (2005) and Björnvatn (2004) formalize this tradeoff between declining reservation prices of potential targets and better export access to the foreign market.

sector? Is this effect stronger in industries with larger tariff cuts (as predicted by equation 3)?

2. Is the effect similar for within- and cross-industry acquisitions? Is it different for domestic and cross-border transactions? Is there a stronger impact on the M&A activity of Canadian firms than on that of U.S. firms?

3. Are acquirers more profitable and more productive than targets? Again, does this effect vary across the different M&A categories (within- vs. between industry and domestic- vs. cross-border)?

Answers to these questions will shed light on the qualitative characteristics of M&A as a mechanism for resource reallocation in the face of trade liberalization. A further interesting question that arises is whether reallocation via M&A is also quantitatively important. While the nature of my dataset does not allow a definitive answer to this question, I will provide some evidence that this is indeed likely to be the case (section 7).

3 The Case of CUSFTA

The particular liberalization episode I will use for my empirical investigation is the Canada-United States Free Trade Agreements (CUSFTA) of 1989. The idea of abolishing trade barriers between Canada and the U.S. had been around for some time before CUSFTA but strong opposition in Canada had led to the eventual failure of all prior attempts at implementing free trade. Against this background and again against substantial political opposition, negotiations for CUSFTA started in May 1986, were finalized in October 1987 and the treaty was signed in early 1988. The agreement came into effect on 1 January 1989 which was also the date of the first round of tariff cuts. Tariffs were then phased out over a period of up to ten years with some industries eventually opting for a swifter phase-out.

In terms of economic analysis, CUSFTA presents several advantages over other trade liberalizations. First, the main instrument of liberalization - tariff cuts - is easily quantifiable and shows a large variation across sectors which allows for the implementation of a difference-in-differences estimation strategy. Secondly, CUSFTA was a clearly defined policy experiment in the sense that it was neither part of a larger packet of market reforms nor was it introduced in response to a macroeconomic shock, two factors that have made the identification of trade reform effects extremely difficult in other settings (Rodrik and Rodriguez, 2001; Trefler, 2004). In this sense, the reductions in tariff rates triggered by CUSFTA can to a large extent be regarded as exogenous - indeed, Trefler (2004) performs formal statistical tests for a wide range of specifications and dependent variables but finds no evidence to the contrary.

In the context of studying the impact of trade liberalization on M&A, CUSFTA has two additional advantages. First, it was largely unanticipated since its ratification by the Canadian

parliament was considered highly unlikely as late as November 1988.[15] The fact that its eventual implementation thus came very much as a surprise to all participants considerably reduces concerns about anticipatory M&A activity and makes the years before 1989 a suitable control period. In addition, CUSFTA was a liberalization agreement between industrialized countries with developed financial markets and few restrictions on mergers and acquisitions, at least in comparison to most other developing and developed countries. Indeed, although there exists, to my knowledge, no econometric evidence to date, there is some anecdotal evidence that CUSFTA has led to an increase in M&A activity (OECD, 2001). Given that a number of existing studies have shown that there has also been a substantial impact on economic variables other than M&A activity (e.g. Trefler, 2004, on productivity and employment; or Head and Ries, 1999, on plant scale and number of plants), it does thus not seem unreasonable a priori to expect an effect of CUSFTA on the acquisition behaviour of firms.

4 Data and Descriptive Statistics

In line with existing studies, my empirical analysis of CUSFTA's impact on M&A activity focuses on the manufacturing sector which still represents the bulk of tradable goods in an economy and is thus the sector most directly affected by trade liberalization. The timeframe for my analysis is 1985-1997, the period for which I have data on tariffs, M&A activity and firm-level characeteristics of targets and acquirers.

Tariffs and M&A Activity. I use three-digit U.S. and Canadian tariff data (140 industries) during the period 1985-1997 as my measure of the extent of trade liberalization.[16] While CUSFTA also included provisions on non-tariff barriers, reductions of tariffs were the main instrument of liberalization. As has been pointed out among others by Trefler (2004) and Topalova (2004), tariff cuts also have the advantage of being a direct policy instrument and as such less susceptible to endogeneity problems. This is in contrast to other more indirect measures like import penetration rates which are the result of a complex interaction process with a large number of additional factors.[17]

[15] See Morck et al. (1998) for a chronology of the events leading up to the eventual ratification of CUSFTA. During the entire process, ratification was considered unlikely given both the prior history of failed ratifications of already negotiated free trade agreements with the U.S. and the strength of the opposition to CUSFTA. Indeed, John Turner, the opposition leader and a strong opponent of free trade with the U.S., publicly vowed as late as October 1988 that he would dismantle CUSFTA in case of victory in national elections scheduled for November 1988. Since his liberal party had a lead of at least 10% in opinion polls until right before the election, ratification did indeed seem unlikely. However, against all odds, the Canadian Conservative Party emerged as the surprise election winner and the government was returned with a parliamentary majority sufficient to ratify CUSFTA.

[16] The data are the same as those described in Head and Ries (1999). I would like to thank Keith Head for making them available to me. Appendix B provides some additional details on their construction.

[17] Also compare footnote 2 and Rodrik and Rodriguez (2001) for a more general discussion of the pitfalls of various other indirect measures. Of course, tariff rates are at the discretion of policy makers and as such subject to different endogeneity problems. However, as argued in the previous section, such concerns have less weight in the case of CUSFTA where tariff cuts were largely exogenous and unexpected.

Data on M&A activity in the manufacturing sector comes from Thomson Financial's Worldwide M&A database. The principal sources of information used by Thomson are over 200 English and foreign language news sources, SEC filings and their international counterparts, trade publications and proprietary surveys of investment banks, law firms and other advisors. The database includes all corporate transactions involving at least 5% ownership of a company and a transaction value of one million USD or more or where the value of the transaction is undisclosed. In line with the discussion in the previous sections, I use all M&A deals involving acquisitions of U.S. or Canadian manufacturing targets by other U.S. or Canadian firms, yielding approximately 23,500 transactions in the period under study (1985-1997). I define "M&A" broadly to include sales of individual business segments and divisions as well as of entire companies. This is consistent with the idea from the theoretical model that M&A can both be a form of contraction and total firm exit. I further consider acquisitions of both majority and minority interests since there is strong evidence that significant influence for the acquirer is already given at participation rates well below 50%.[18] Transactions are classified into three-digit industries and matched with the tariff data according to the primary activity of the target company or the acquired business segment (see appendix B for details). For the purpose of this study, I will use the number of mergers and acquisitions in a given period as my principal indicator for M&A activity. Using numbers rather then aggregate deal volumes has two principal advantages. First, it is the much more readily available indicator since for the majority of deals, transaction values are not published (this is the case for 55% of deals in my dataset). Second, value measures are extremely sensitive to the treatment of very large deals which often make up significant proportions of the total deal volume despite representing only a few out of several thousand transactions every year. In my sample, for instance, the three biggest deals on average make up about 20% of the total deal volume in a given year. Within three-digit industries (the aggregation level of my empirical analysis), the biggest transaction alone accounts on average for over 30% of total industry volume during the entire period 1985-1997.

Tables 1 and 2 provide some descriptive statistics on M&A activity and manufacturing tariffs in North America over the period 1985-1997. I start with an analysis of target firms. The first four columns of table 1 show the number of M&A transactions in the U.S. and Canada at the two-digit level of the U.S. Industrial Classification of 1987. As seen, domestic M&A activity (columns 1 and 4) is more common than cross-border transactions (columns 2 and 3), even for the smaller Canadian market. Looking across industries, it becomes apparent that there is substantial variation in the number of deals. One simple reason for this is probably that different industries have very different numbers of firms and establishments and thus more or less "potential" for takeovers. Sectors with more players usually also have lower concentration ratios and face less scrutiny by antitrust authorities. Columns 5-6 which list the average number of establishments per industry confirm

[18] Morck et al. (1998) cite evidence that the threshold for effective control lies on average at about 20% in the U.S.. Similarly, the Canadian Competition Bureau (2002) considers all acquisitions of more than 10% of control rights as potentially anti-competitive, with the corresponding figure for the U.S. being 15% (Brealey and Myers, 2000, chapter 33). In any case, minority acquisitions comprise only about 12% of transactions in my sample. See section 5 for robustness checks excluding this category.

these conjectures: industries with more establishments have more M&A activity - the correlation coefficient between the number of establishments and total M&A transactions is +52% for the U.S. and +55% for Canada.[19] More subtly, there also seems to be a connection between M&A activity and initial tariff rates (columns 7-8): industries with higher import tariffs in 1988 also experience less takeovers during the entire period 1985-1997 (the correlation coefficient is -32% for the U.S. and -48% for Canada). This seems in part to be a direct consequence of the relation between M&A activity and the number of establishments: highly protected industries are usually industries in decline which already have experienced shakeouts and have relatively few remaining players.

The next question is who the buyers of U.S. and Canadian manufacturing firms are. Table 2 provides some information on this by listing the principal field of activity of acquiring firms. As the figures show, roughly 70% of acquirers are also manufacturing firms, both in the U.S. and in Canada. Moreover, about 35% of transactions occur within the same three-digit sector and another 13% within the same two-digit sector, so that within-industry reallocation via M&A seems to be an important phenomenon. Around 17% of acquirers of U.S.-firms (21% for Canada) have their principal field of activity outside manufacturing (SIC-codes 2-3), although this figure probably overestimates the incidence of diversifying or conglomerate M&A. This is since about one quarter of non-manufacturing acquirers actually possess secondary fields of activity in manufacturing, with the figure being as high as 50% in some categories (see columns 3 and 7).[20]

The second to last line of table 2 lists a category of acquirers that deserves special attention. The group "Investors, n.e.c." (SIC 6799) represents an amalgamation of different types of acquirers that are not easily classifiable elsewhere. The main subgroups of SIC 6799 are private equity and venture capital firms, investor groups and individual investors. In all cases, it seems likely that acquisition by these groups represents a significant reallocation of resources in the sense that targets will be exposed to substantial changes in management practices, restructuring etc. Also, among investor groups, alliances of different manufacturing firms are not uncommon so that part of SIC 6799 are indeed within-manufacturing acquisitions. For these reasons, I keep transactions involving SIC 6799 as part of my sample though I will present robustness checks excluding this category.

Target and Acquirer Characteristics. For the comparison of target and acquirer characteristics in section 6, I match the transaction parties from the Thomson M&A database to Compustat North America and Compustat Global using the CNUM-identifier common to both datasets. Thomson Financial itself also provides financial data on a small number of targets and acquirers which I use to complement the information from Compustat. My indicators of firm performance will

[19] Sources for number of establishments: U.S. Census Bureau and Statistics Canada. I use the number of establishments rather than the number of firms since my definition of M&A includes both acquisition of entire firms and of individiual subdivisions and possibly plants.

[20] Looking at secondary fields of activity also increases the numbers of transactions that are potentially of within-industry nature. Columns 4 and 8 show the fraction of acquirers that have at least one manufacturing 3-digit SIC code that matches the primary or any secondary manufacturing SIC code of the target. If one counts all these transactions as intra-industry, the share of this reallocation type rises to 40% which represents only a modest increase of about 5%-points. Since this is clearly an upper bound, classification according to primary fields of activity seems to be a good approximation in determining the within- or between-industry nature of M&A.

be net sales, pre-tax income, the number of employees and productivity and profitability measures based on these variables.[21] The three indicators net sales, income and employees are available for between 7,500 to 12,500 out of the 47,000 company-year combinations in my data (some companies are involved in several transactions in the sample period).

The use of Compustat implies that my sample for comparing target and acquirer characteristics consists mainly of publicly traded firms (although about 5% of firms are privately held). I believe that this does not pose major problems for the analysis. First, publicly traded firms make up a substantial fraction of the full sample of transaction parties used to analyse changes in M&A activity (about 35%, with private companies and firm subsidiaries making up the remaining 65%). Second, as I will show in the next section, the impact of CUSFTA on publicly traded firms was if anything slightly stronger than for the full sample of firms. Third, although the number of publicly traded firms is small relative to the overall number of companies in Canada and the U.S., their overall share of output and employment is above 80%.[22] Thus, even if target-acquirer differences for non-publicly traded firms were very different, the findings presented in section 6 would still have strong economic relevance.

Quantitative Importance of M&A: For the comparison of the amount of firm-level resource reallocation due to M&A, contraction and exit I will again rely on information for publicly traded firms from Compustat Global and Compustat North America. In addition to data on output (net sales) and employment, I use information on the reason for deletion of companies from the Compustat files.[23] I include all manufacturing firms listed as active in either Compustat North America or Compustat Global at some point during the period 1985-1997. After dropping some smaller Canadian firms for which no exit information is available, this yields a sample of 331 Canadian and 5827 U.S. firms which again represent over 80% of manufacturing output and employment in North America.

5 Trade Liberalization and M&A

5.1 A First Look at the Figures

How has M&A activity in North America evolved over time and what was the impact of CUSFTA? Figure 1) plots the number of yearly manufacturing M&A transactions over the period 1985-1997 for the four different categories, all expressed as indices relative to 1988: domestic U.S. transactions, domestic Canadian transactions, acquisitions of U.S. firms by Canadian firms and acquisitions of

[21] The exact sources for Compustat North America are data items 12 and 117 (net sales), 122 and 170 (pretax income) and 29 and 146 (employees). For Compustat Global, data are contained in items 1 (net sales), 21 (pretax income) and 162 (employees). I use 4-digit sectoral deflators to convert nominal values to 1987 values. I then convert entries in Canadian dollars to US dollars by using the PPP exchange rate for the baseyear 1987.

[22] This figure is based on a comparison of aggregate production and employment in Compustat North America and Compustat Global with comparable data from the UNIDO database.

[23] The relevant Compustat North America data items are 12 and 117 (net sales) and 29 and 146 (employees). Date and reason for deletion are provided in data footnotes AFTNT33-AFTNT35. For Compustat Global, sales and employee data are contained in items 1 and 162, and reason and date of deletion in the variables INCO and INCOD.

Canadian firms by U.S. firms. The graphs also indicate the start date of CUSFTA (1 January 1989) by a vertical line and have linear splines fitted to the data points pre- and post CUSFTA.

The figures do not reveal any clear effect for both U.S. domestic activity and Canada-U.S. takeovers. Takeovers of Canadian firms, however, both by other Canadian and U.S. firms, show a marked increase in 1989, the first year after implementation of CUSFTA. At the same time, all graphs display a general strong upward trend in the number of M&A deals over the entire period. This provides some first evidence on the problems of descriptive studies that comment on M&A activity in the wake of CUSFTA and NAFTA (such as OECD, 2001): the strong increases in transactions in the 1990s might simply reflect an underlying long-run trend. The before-after comparisons undertaken here do not have this problem although it could still be that changes around 1989 are due to other contemporaneous factors (for example, CUSFTA also contained a liberalization agreement on cross-border capital flows).

To provide stronger evidence that the observed changes in M&A activity are indeed due to CUSFTA, I thus split transactions within each of the four categories into two groups (figure 2). Those from the 50% of target industries that faced the steepest tariff cuts and those from the remaining 50%. I choose tariffs levied by the target's country for this classification. In practice, U.S. and Canadian tariff cuts are very highly correlated so that results are similar when using the other tariff measure. From these figures, a slightly different picture emerges. For the two domestic categories, the index of M&A activity is very similar across the two groups in the pre-CUSFTA period. From 1989 onwards, however, M&A activity in Canada increases by substantially more in the most affected group. For the U.S., there is also a slightly more pronounced increase for this group although the difference to the least affected group is much smaller than in Canada. It thus seems that the impression from the initial graphs holds up to this difference-in-differences analysis. M&A activity in Canada rose sharply after 1989 and the magnitude of this increase seems to be related to the extent of tariff cuts across sectors. The impact on the U.S. is much smaller, consistent with the notion that the liberalization shock was substantially bigger in Canada which integrated with a market ten times her own size.

Turning to the cross-border categories (the two right hand side panels), the graphs show slightly more volatility than in domestic M&A activity, reflecting in part the smaller number of transactions across the U.S.-Canadian border. Still, it seems that effects on cross-border M&A went in opposite directions. While Canadian acquisition activity in the U.S. shows a slightly stronger increase in the group of most affected industries, the opposite holds true for takeovers of Canadian by U.S. firms. Note that this last finding is consistent with tariff-jumping motives as an additional M&A determinant for cross-border transactions. That is, in industries with stronger Canadian tariff cuts, US firms were less dependent on acquiring local production capacity to serve the Canadian market. Increasing returns to scale may have reinforced this trend by inducing U.S. firms to concentrate production in their larger domestic market. Such home-market effects may also explain the stronger increases in Canadian acquisitions in the U.S. in the most-affected group, which took place despite

easier export access to this market.[24]

5.2 Econometric Specification and Baseline Results

This section evaluates whether the impressions from the graphs of the last section carry over to a formal econometric analyis. Among other things, the results obtained so far have drawn attention to two potential pitfalls such an analysis faces. First, M&A activity shows strong inter-industry variation and is negatively related to initial tariff levels (see section 4). Since all tariffs were eventually eliminated under CUSFTA, higher initial levels also meant stronger subsequent cuts, implying a potentially spurious correlation of tariff changes and M&A activity. Second, the strong increase in the number of mergers and acquisitions over the whole period 1985-1997 suggests the presence of a general economy-wide trend in M&A activity. Since all tariffs came down after 1989 this could again lead to a spurious correlation with tariff cuts. To address these issues, I will implement a difference-in-differences approach by controlling for both industry and time fixed effects.

To obtain guidance on the choice of an appropriate econometric specification, I turn to the theoretical model derived earlier. There, the volume of capital reallocation was given by $CR = \frac{a\lambda K}{[1+\lambda]^2\tau}|d\tau|$ (equation 3), where $|d\tau|$ was the absolute change in variable trade costs, K an economy's capital stock, λ a measure of initial trade costs (both fixed and variable), and $a > 0$ the Pareto-distribution's shape parameter.

First consider the choice of empirical proxies for $|d\tau|$ and CR. In the model, variable trade costs τ are of the iceberg-type and thus relate to tariffs t as $\tau = 1 + t$ which implies $d\tau = dt$. My measure for $|d\tau| = |dt|$ will thus be the absolute change in tariffs from the pre-CUSFTA year of 1988 to the last year for which I have tariff data (1997). As $dt \leq 0$ for all sectors, this absolute change is $|dt| = -dt =$tariff$_{1988}$-tariff$_{1997}$. Because CUSFTA was a bilateral liberalization agreement and the treaty partners tended to protect the same sectors, the magnitude of U.S. and Canadian tariff cuts is very similar across industries. In line with previous empirical studies of trade liberalizations - which mostly look at unilateral tariff reductions by a particular country - I opt for domestic tariffs. That is, I use Canadian tariff cuts when analysing the impact of CUSFTA on takeovers of Canadian firms and U.S. tariffs cuts for transactions involving U.S. targets.[25] As already mentioned, my proxy for the amount of reallocation via M&A (CR) is the number of transactions (denoted MA) which I aggregate over the pre- and post CUSFTA-period (1985-1988 and 1989-1997) in order to smooth the data and reduce the number of zero observations. This yields a panel with two time periods and 140 industries. With these choices of proxies for $|d\tau|$ and CR, I can write my specification as:

[24] An often cited example that fits these explanations is the earlier North American Autopact of 1964 which liberalised automotive trade between Canada and the U.S.: no longer facing prohibitive tariffs, U.S. firms were able to concentrate production in their larger home market and serve the Canadian market through exports rather than through local production.

[25] Robustness checks using foreign tariff reductions as regressors yielded similar results which is unsurprising given the very high correlation of tariff cuts (in excess of 80%). An interesting area for future work would be to study more asymmetric liberalization agreements with sufficient independent variation in tariff cuts. Such agreements would allow to separately identify the effects of import- and export-promoting policies on M&A activity.

$$MA = \frac{a\lambda K}{[1+\lambda]^2 \tau} |dt| \tag{4}$$

Given the multiplicative form of (4), one possibility would be log-linearization and estimation via OLS. However since the occurence of zeros in MA is still frequent, in particular for the cross-border merger categories, such an approach is not feasible. Also note that MA is a non-negative and usually small integer, suggesting that count data models are a more appropriate choice here. To obtain a corresponding specification, I rewrite the right-hand side of (4) in exponential form:

$$MA = \exp(\ln a + \ln K + \ln \frac{\lambda}{[1+\lambda]^2 \tau} + \ln |dt|) \tag{5}$$

The identifying assumption I will initally make (but later relax) is that the various components of (4) besides $|dt|$ are either time- or industry invariant and can thus be captured by time- and industry fixed effects, d_i, d_{pre} and d_{post} (where d_{pre} and d_{post} denote the pre- and post CUSFTA period, respectively).[26] Writing (4) in expectations form and using the dummy variables just defined then yields a conditional mean exactly identical to the one found in fixed-effect count data models:

$$E(MA_{it}|dt, d_i, d_t) = \mu_{it} = \exp(d_i + d_{pre} + d_{post} + \beta \times d_{post} \ln |dt|_{it}) \tag{6}$$

If I further assume that MA_{it} follows a Poisson distribution, i.e. $\Pr(\text{MA}_{it} = n_{it}) = \frac{e^{-\mu_{it}} \mu_{it}^{n_{it}}}{n_{it}!}$, I obtain the fixed-effects Poisson model. I opt for fixed-effects Poisson rather than a negative binomial model since the former has the desirable robustness property that consistency of estimates will be achieved as long as the conditional mean (6) is correctly specified, irrespective of whether MA_{it} actually follows a Poisson distribution (Wooldridge, 1999). Standard errors will be affected by deviations from the Poisson assumption but computation of variance-covariance matrices robust to overdispersion, heteroskedasticity and within-group correlation is straigthforward (Wooldridge, 1999 and 2002).

Table 3 reports results for my baseline Poisson fixed-effects model (5) for the full sample of acquirers, i.e. manufacturing firms from the same three-digit sector as the target, manufacturing firms from other sectors and firms with principal activities outside manufacturing. Line 1 shows coefficient estimates of β and d_{post} for each of the four subgroups of M&A (domestic and cross-border transactions) as well as the number of observations used in each estimation.[27] As seen, the

[26] Since the parameter a, initial trade barriers λ, and countries' capital stocks K are all constant in the model, this identifying assumption is consistent with the earlier theory. Obviously, various industry-level shocks might cause time-industry-variation in a or K, a point which I discuss in more detail below and try to control for.

[27] d_{pre} is the excluded category so that d_{post} gives the average relative increase of M&A activity in comparison to the pre-CUSFTA period that is not explained by tariff cuts. The number of observations varies across columns since the use of fixed-effects Poisson requires at least one transaction per industry for that industry to be included in the estimation. This is due to an incidental parameter problem which arises in MLE estimation of panels with a short time-dimension. As is well known, the fixed effects d_i cannot be consistently estimated in such a setting and this inconsistency will carry over to the other parameters. This problem can be solved by conditioning the industry likelihood contributions on $MA_i = \sum_t MA_{it}$ but this requires at least one transaction for an industry to be included in the estimation (see e.g. Wooldridge, 2002).

strongest impact of CUSFTA seems to be on domestic Canadian M&A activity which is consistent with the earlier graphical analysis. As an approximation, the coefficient estimates suggests that each doubling of tariff cuts in a given target industry led to an increase of 36.5% in the number of domestic Canadian M&A transactions. Results are also significantly positive for U.S. domestic M&A activity, although the magnitude of the coefficient estimate is only about 1/5 of its Canadian counterpart.

Lines 2-3 of table 3 show results for two alternative measures of tariff cuts. The first measure uses absolute changes in tariffs, i.e. $d_{post} \times (\text{tariff}_{1988} - \text{tariff}_{1997})$ rather than $d_{post} \times \log(\text{tariff}_{1988} - \text{tariff}_{1997})$. This gives equal weight to each percentage point of tariff cuts, irrespective of the overall magnitude of the reduction. The second measure is a binary indicator taking the value one if an industry is among the 50% of industries with the highest tariff cuts, i.e. $d_{post} \times 1(dt > dt_{50\%})$. This measure is thus similar to the one used in the graphic analysis from the last section. The results from these two alternative measures show a qualitatively similar picture to the baseline estimates for domestic M&A activity, i.e. the impact on Canada seems to have been much stronger.[28] The coefficient estimates for the absolute change in tariffs - which is the most straightforward of all measures in terms of interpretation - indicate that for every percentage point decrease in tariffs the number of takeovers of firms in the affected industries increased on average by 8.3%. Given that the mean decline in Canadian tariffs at the three-digit level was about 8%, this suggests that CUSFTA increased M&A activity by approximately 65%. The corresponding coefficient for the U.S. is much lower (0.98) but still marginally statistically significant. This again highlights the differential impact of CUSFTA on the two markets, in particular if one takes into account that the mean U.S. tariff decline was only about 4% (yielding an estimated average impact on M&A activity of just 4%). Taking into account all three tariff cut measures, the picture is less clear for the cross-border merger categories since coefficients are mostly statistically insignificant. Qualitatively, however, the estimates give a similar impression as the earlier graphs: Canadian acquistions in the U.S. have gone up as a result of tariff cuts while U.S. acquisitions in Canada have come down.

5.3 Robustness Checks

Control Variables I have so far relied on the assumption that tariff cuts were the only time- and industry varying determinants of M&A activity, which allowed me to identify the effect of CUSFTA from a simple difference-in-differences approach without additional controls. While M&A activity will in practice also be influenced by other time-industry varying factors, one has to proceed carefully when choosing appropriate control variables. First, I will refrain from using a number of obvious industry-level variables like employment, output, the number of firms or productivity growth. Besides likely endogeneity problems, the common concern with these variables is that there is ample evidence that they are themselves strongly influenced by trade liberalization (for

[28] Note that according to standard model selection criteria for maximum likelihood models (e.g. pseudo-R2s) the theory-based based measure actually provides a marginally better fit than the two adhoc-measures. For the three baseline specifications estimated here, the results for the pseudo-R2s are: 0.87 (log changes), 0.86 (absolute changes), and 0.85 (binary measure).

the effects of CUSFTA see in particular Trefler, 2004, and Head and Ries, 1999). Since it is indeed through their influence on such variables that tariff cuts change incentives for M&A, controlling for them would invalidly attribute less of the increase in takeover activity to freer trade. A similar criticism applies to a number of determinants that have been proposed in the Corporate Finance literature on M&A activity, like capacity utilization, sales growth, free cash flow or relative price-earnings ratios (Mitchell and Mulherin, 1996; Mulherin and Boone, 2000; Andrade and Stafford, 2004; Gugler et al., 2004). In addition, some of these variables are of an inherently firm-level nature and thus unsuited for the present industry-level analysis.[29]

In the light of these difficulties, I choose to pursue a different route and try to control for time- and industry-varying factors other than tariff cuts by including the number of takeovers of firms in the same industry in the United Kingdom, France and (West) Germany.[30] The idea behind this approach is that these countries were largely unaffected by CUSFTA and changes in takeover activity there should thus pick up any general industry-level trends in underlying M&A determinants. Since many factors which might potentially influence takeover rates are highly correlated across developed countries, these trends are likely to be similar in Europe and in North America. Examples include oil price shocks, low sales growth and low capacity utilization combined with large amounts of free cash flow in declining industries, or strongly increasing price-earnings ratios in times of stock market bubbles. Indeed, the simple correlation between the number of European and U.S. or Canadian M&A transactions per period and industry is on average about 70%. Note that I exclude any acquisitions of North American firms in Europe or vice versa from the EU numbers. This avoids endogeneity problems arising from the fact that M&A transactions in North America could be a substitute for cross-Atlantic transactions in some cases.[31]

Lines 4-6 of table 3 show the results for all three tariff cut measures with the controls in place. I use domestic M&A in the UK, France and Germany as the control for the two regressions on domestic M&A activity and all cross-border M&A with targets in one of these three countries as the control for the cross-border categories (excluding acquisitions by U.S. or Canadian firms). As seen, the coefficients estimates are very similar to the earlier results, consistent with the idea that industry and time fixed effects already captured most of the influence of non-tariff related determinants of M&A activity.

[29] Variables of this type analysed in the literature are Tobin's q, free cash flow and price-earnings ratios. As discussed for example by Andrade and Stafford (2004), there is no straightforward way to aggregate these determinants from the firm to the industry level since their impact is highly non-linear or depends on differences between targets and acquirers.

[30] These are the three developed countries for which M&A coverage in Thomson Financial is reasonably complete back to 1985.

[31] A remaining issue might arise from the implementation of the European Common Market during the period 1986-1992. However, the impact on M&A activity through changes in manufacturing trade is likely to have been small. This is since much more substantial measures like duty-free trade, common external tariffs and many common sectoral policies had already been in place for more than a decade by 1986. A more novel aspect of the common market was the liberalization of cross-border capital flows. This measure, however, showed little cross-sectoral variation and should as such be captured by my period fixed-effects.

Results for Different Subsamples I perform further robustness checks by looking at specific subsamples of M&A transactions. I start by excluding the acquirer SIC-code 6799 ("Investors, n.e.c."). As discussed earlier, a large fraction of this category is made up by private equity and venture capital firms as well as private investors, groups which do not neatly fit into the earlier theoretical framework. However, results are basically unaffected by the exclusion of this group as is shown in the first three lines of table 4.

Next, I drop acquisitions of minority interests from my sample, i.e. transactions at the end of which the acquirer holds less than 50% of control rights or already held more than 50% initially. The corresponding coefficient estimates (lines 4-6) show a slightly stronger impact of tariff cuts on domestic Canadian M&A activity while estimates for domestic U.S. transactions drop somewhat and are now mostly statistically insignificant (except for the binary tariff cut measure).

In lines 7-9, I look at M&A transactions taking place within identical 3-digit manufacturing industries. These specifications are thus closest to the theoretical model presented in section 2 which looked at within-sector reallocation via M&A. From the regression results it appears that CUSFTA affected within-sector M&A activity in broadly similar ways to overall M&A activity, albeit with some minor exceptions. First, there is a slight decrease in statistical significance for the Canadian categories although this should in part be due to the now lower number of observations. For the tariff measure using absolute changes, there is also a strong increase in coefficient magnitude for U.S.-by-Canada-acquisitions but this change is not repeated for the other functional forms.

Finally, I restrict my sample to include only transactions involving publicly traded firms. This is of interest since the following sections, which look at target and acquirer characteristics and the quantitative importance of M&A as a form of reallocation, will almost exclusively rely on data for publicly traded firms. It is thus useful to check whether the qualitative results found so far also apply to this particular subsample of firms. In addition, publicly traded firms tend to be bigger and are more likely to be exporters which suggests that CUSFTA's impact may indeed have been different for this group. However, lines 10-12 of table 4 show that this is not the case for domestic M&A activity. The cross-border M&A regressions, in contrast, do show somewhat stronger results for this subsample. U.S. acquisitions by Canadian firms seem to be more affected by CUSFTA now, with coefficients mostly being significant and large in absolute magnitude. Also, U.S. acquisitions in Canada are positively related to tariff cuts in this subsample although none of the estimates are statistically significant.

Changes in Competition Policy as an Alternative Explanation? As the above graphs and estimations make clear, the main reaction from CUSFTA seems to have come from domestic Canadian M&A activity. This brings up an alternative explanation for the results found so far. Canadian competition authorities might have became more lenient vis-à-vis domestic M&A activity given the increased competition from U.S. firms. If this relaxation of supervision was correlated with the extent of Canadian tariff cuts (e.g. because the competition authorities took them into account in their definition of the relevant market), this could provide an alternative explanation for

my results. Note, however, that such a policy change is not incompatible with M&A as a means of resource reallocation: the need for reallocation after CUSFTA could have been the underlying cause for increased M&A activity and a more lenient stance from the competition authorities may have merely facilitated the adjustment. One would thus need the additional argument that Canadian industries were already poised for consolidation before CUSFTA and that relaxation of merger guidelines then eliminated restraining regulatory barriers. While it is difficult to definitely exclude this possibility, documents and statements published by the Canadian Competition Bureau do not show any support for this hypothesis.[32] Also, if a looser competition policy was responsible for the surge in M&A activity one would expect to see a far stronger effect for within-industry transactions which is not the case.[33]

6 The Nature of Reallocation via M&A

The last sections have provided evidence that CUSFTA lead to a reallocation of resources via M&A, in particular in Canada and both within and between industries. This section looks in more detail at the characteristics of acquirers and targets and tries to determine whether M&A plays a similar role in transferring resources as exit and contraction. The existing literature has shown that these two channels involve a reallocation away from less productive firms and plants. While it is typically not possible to track the employment of factors of production in these studies, the parallel expansion of high productivity establishments seems to indicate that they re-employ at least part of the freed-up resources. The question thus arises whether M&A similarly leads to a channeling of resources towards more productive owners.

A simple way of comparing targets and acquirers is to regress proxies for firm performance on dummies for whether a company is a target or an acquirer in a transaction. For this, I use data from Compustat North America and Computstat Global as described in section 4. I start by looking at net sales and the number of employees to get an impression of the size differences between targets and acquirers. Next, I compare levels of profitability, using pretax income per employee and pretax income per net sales as proxies. Recall from the theoretical section of this paper that more productive firms were predicted to be both larger and more profitable than less productive firms. Thus the above comparisons might also be seen as a first check on underlying productivity differences. Since in practice, differences in size and profitability might also be due to other factors, I additionally use labor productivity as a more direct proxy.[34]

The basic econometric specification I estimate is:

[32] See http://www.competitionbureau.gc.ca/ and in particular the revised "Merger Enforcement Guidelines" from 1991.

[33] A bigger increase would be expected for this category since horizontal M&A is the main focus of the competition authorities. According to the Canadian Competition Bureau (1991) vertical and conglomerate M&A transactions were rarely the object of regulatory restrictions.

[34] The absence of a reliable capital stock measure in Compustat makes calculating TFP infeasible. Note that since Compustat does not provide information on intermediate inputs, I assume that variations in the intermediate share are not systematically related to target or acquirer status.

$$y_{tj} = \alpha + d_t + \beta_1 \times target_{tj} + \varepsilon_{tj} \tag{7}$$

where y_{tj} is the proxy of interest for company j in period t, d_t represents time-fixed effects and $target_{tj}$ is a dummy that takes the value one if the company in question is a target.[35] The coefficient of interest is thus β_1 which gives the difference between targets and acquirers (which are the omitted category). Block 1 of table 5 shows results for these baseline regressions. Acquirers are found to be significantly bigger in terms of both sales and number of employees (columns 1 and 2). Interestingly, using estimates of α, d_t and β_1 for the two pretax income regressions (columns 3 and 4) one finds for most years of the sample that targets were on average making slight losses prior to takeover. Finally, the mean productivity advantage of acquirers over targets is of the order of 12% and is highly statistically significant (column 5).

My baseline specification uses both U.S. and Canadian companies. I next allow differences to vary according to the nationality of targets and acquirers by including the corresponding interaction terms:

$$y_{tj} = \alpha + d_t + \beta_1 \times target_{tj} + \beta_2 \left(target_{tj} \times US_{tj}\right) + \beta_3 \left(acqu_{tj} \times US_{tj}\right) + \varepsilon_{tj} \tag{8}$$

where $acqu_{tj}$ and US_{tj} are binary variables indicating whether a company is an acquirer and/or a U.S. company. Results are presented in block 2 of table 5 and are qualitatively very similar to the baseline specifications. With the exception of net sales, none of the estimated additional differences $(\hat{\beta}_3 - \hat{\beta}_2)$ is significantly different from zero and most of the U.S. interaction terms are also insignificant. The first block of Table 6 presents results from a series of F-tests which evaluate whether differences between acquirers and targets vary across the four different M&A categories. For example, line three compares U.S. acquirers with Canadian targets. As seen, all differences are significantly positive, indicating that in both domestic and cross-border transactions, acquirers are bigger, more profitable and more productive than targets.

In a last step, I augment specification (8) with industry fixed effects to control for potential variation in company characteristics across industries. Block 3 of table 5 contains estimates for this final specification which are again close to the initial results. Since β_1 is now identified from within-industry variation, this also indicates that acquirer-target differences are similar irrespective of whether transactions are of cross- or within-industry nature. The only qualitative change as compared to the previous results is an increase in the differences between U.S. and Canadian coefficient estimates. One consequence is that acquisitions of U.S. firms by Canadian ones no

[35] Note that specification (7) pools all available data for targets and acquirers rather than calculating a target-acquirer difference for each merger and estimating the mean difference. This is necessary since for most mergers I do not have financial data on both parties. Note that for a given sample of mergers without missing data these two approaches are identical. Also, while pooling data increases the number of acquirers relative to targets (because data availability is generally better for larger firms and acquirers tend to be larger), the resulting bias is likely to work against and not in favor of finding significant differences. This is since it is the smaller targets that get excluded from the sample (and since - at least in my sample - smaller size in terms of either net sales or employment is associated with on average lower profitability and productivity).

longer show significant productivity differentials (see the second block of table 6). For all other categories and variables, however, acquirer-target differences remain similar to the previous results.

7 The Quantitative Importance of the M&A Channel

The findings so far are supportive of the view that CUSFTA has triggered a reallocation of resources via M&A, especially in the smaller Canadian market. It also seems that this reallocation was from less to more profitable and productive firms, similar to the channels analysed in the previous literature (i.e. contraction and exit). A question that naturally arises from these observations is how important firm-level reallocation via M&A is *quantitatively*, both in absolute terms and relative to the two other forms of adjustment to freer trade.

While the absence of a control group of firms not engaging in M&A in Thomson Financial prevents me from giving a definite answer to this question, some progress can be made in a more indirect way. In particular, the available data allow an analysis of how important M&A is as a form of overall resource reallocation, i.e. not necessarily linked to trade liberalization. Against this baseline, the increases in M&A activity that are due to CUSFTA can be judged on their quantitative importance. Since the previous literature has established results on how CUSFTA affected the likelihood of firm- and establishment closures, one can also get a first impression on how M&A compares to this alternative form of adjustment.

First consider the general importance of M&A as a form or reallocation. For this purpose, I rely again on information for publicly traded firms from Compustat North America and Compustat Global as described in section 4.[36] Of the 331 Canadian and 5827 U.S. firms contained in the Compustat sample, about a quarter exits during the sample period due to M&A or bankruptcy related reasons with M&A accounting for 82% of all exits (see table 7).[37] That is, M&A seems to be by far the most important exit form for publicly traded firms in North America. Table 8 delves deeper by quantifying the average annual amount of jobs and production (net sales) reallocated through the two exit forms. In addition, I also look at the third form of reallocating resources away from contracting firms, i.e. decreases in employment and sales at continuing companies. The resulting figures show that while reductions at existing firms are the most important form of reallocation, M&A is responsible for about 25% of job- and 30% of sales volume redeployment.

[36] Note that one alternative to the approach taken here would be to use the Compustat sample to estimate the impact of trade on the three adjustment channels, e.g. using a multinomial probit model. However, this would only give an estimate of the impact of trade liberalization on the relative incidence of the channels rather than the magnitude of reallocation involved. More importantly, there are some important limitations of the Compustat sample which prevent such a more detailed analysis. First, the focus on publicly traded firms means the number of Canadian firms is too small for the level of disaggragation used here (I have 140 sectors but only have exit information on 331 firms in Canada). Second, I have no information on acquirers so that I cannot perform splits into the impact of CUSFTA on cross-border and domestic activity which was found to be very different. Finally, there are some issues related to the timing of exit and M&A since the date of deletion from Compustat need not correspond exactly to the actual transaction date.

[37] Exit rates are lower in Canada (13% vs. 28% in the US) but the share of M&A is even bigger (91% vs. 82% in the US). These differences are probably in part due to the specific sample used here which excludes some of the smaller Canadian publicly traded firms listed in Compustat for which no exit information is available (these represent about 10% of output and employment of all Canadian Compustat firms).

These figures are very similar for both the U.S. and Canada and demonstrate that M&A is indeed a quantitatively important way of transferring resources between firms. For the publicly traded companies analysed here, it also far outweighs exit via bankruptcy as the third reallocation channel. It is likely that this exit form will be more important among smaller, non-publicly traded companies and that turnover at continuing firms will also be higher for this group (see Davis et al., 1996). On the other hand, it has already been pointed out that publicly traded firms account for over 80% of manufacturing output and employment in North America. Thus, the overall quantitative importance of M&A is unlikely to decrease by much in a more comprehensive sample.

Combined with the earlier findings that CUSFTA led to large increases in domestic M&A activity in Canada (over 60% according to my estimates), these results suggest that the amount of reallocation involved was indeed substantial. Also note that while some previous studies on CUSFTA's impact on Canada have found that exit rates increased with trade liberalization, the magnitude of the increase is well below 60%.[38] Seen in combination with the above findings that exit by bankruptcy is unlikely to account for large amounts of reallocation, this suggests that M&A was indeed the more important form of adjustment to CUSFTA.

8 Conclusions

This paper examined the empirical relevance of mergers and acquisitions (M&A) as a channel of firm-level adjustment to trade liberalization. Guided by the insights from a simple theoretical model, I used the Canada-U.S. Free Trade Agreement (CUSFTA) of 1989 to estimate the impact of freer trade on M&A activity. I argued that CUSFTA provided an ideal setting for this purpose in many ways. It was a liberalization agreement between industrialized countries with comparatively few restrictions on takeovers; it represented a source of unanticipated and largely exogenous variation in trade barriers; and its main instrument - tariff cuts - was a direct and easily quantifiable trade policy measure with substantial sectoral variation. Implementing a difference-in-differences identification strategy, I found a rich set of results. While there does not seem to be a robust link between cross-border M&A and trade liberalization, reallocation via M&A between domestic firms is an empirically relevant phenomenon. This is particularly true for Canada, where I estimate a tariff cut-related increase in domestic M&A activity of over 60%. There also seems to have been an effect on domestic U.S. transactions, albeit a substantially smaller one which is consistent with the idea that CUSFTA presented a much less important trade shock for the large American market.

In order to compare reallocation via M&A to adjustment via firm contraction and exit by bankruptcy, I further presented evidence on the nature and quantitative importance of the M&A channel. Using a large sample of publicly traded firms, I found that M&A involved a reallocation of resources from low to high productivity firms and that its magnitude is likely to have been quantitatively important. Taken together, these results suggest that for firms adjusting to freer

[38] The results that are most comparable to this paper are the ones by Gu et al. (2003). Controlling for industry- and time-fixed effects, they find that the Canadian tariff reductions due to CUSFTA caused an increase in the average firm exit rate of Canadian firms by 0.45%-points or about 4.5% (see their table 5).

trade, M&A represents an important alternative to changes at the establishment-level such as plant closures or contraction.

There are a number of implications arising from these findings. First, the extent of reallocation found in previous studies might underestimate the true economic impact of freer trade since changes in control rights at continuing establishments have not been taken into account. This points to the possibility that the short-run adjustment costs of trade liberalization might be higher than previously thought. On the other hand, it also shows that reallocation often takes less drastic forms than mass layoffs and plant closures. Indeed, if M&A does represent a swifter and more efficient way of transferring resources, this would have important implications for competition policy. In particular, one would like antitrust authorities to facilitate the necessary reallocation by reducing restrictions on acquisitions in the wake of trade liberalizations. Given the generally higher level of restrictions imposed on M&A activity in developing countries, this proposition could be of particular relevance there. This line of thought is reminiscent of certain strands in the corporate finance literature (in particular Jensen, 1993) which argue that takeovers represent a far superior way of restructuring industries than internal adjustments or bankrupcty and as such should not face unnecessary legal restrictions.

This paper has provided evidence that M&A is important in understanding firm-level reactions to trade liberalization. The findings presented here suggest a number of important areas for further research. For example, it would be of interest to replicate my results for trade liberalization episodes in developing countries where different regulatory environments, lower stock market capitalization and more restricted availability of credit might imply a different and possibly more restricted role for M&A. Another promising extension would be to investigate in more detail how M&A compares to the alternative adjustment channels of exit and internal expansion or contraction. Besides looking at how firm- and industry-characteristics influence the choice of adjustment strategy, I am particularly interested in evaluating the relative efficiency of the different channels. Using certain exogenous restrictions on M&A (ownership structure, legal barriers to acquisitions etc.), it should in principle be possible to compare the performance of firms and industries that were able to use M&A as an adjustment mechanism with other firms and industries that had to rely on other forms of adjustment.

References

[1] Andrade, G., M. Mitchell and E. Stafford (2001), "New Evidence and Perspectives on Mergers", Journal of Economic Perspectives, 15, 103-120.

[2] Andrade, G. and E. Stafford (2004), "Investigating the Economic Role of Mergers", Journal of Corporate Finance, 10, 1-36.

[3] Bernard, A.B., J. Eaton, J.B. Jensen and S.S. Kortum (2003), "Plants and Productivity in International Trade", American Economic Review, 93(4), 1268-1290.

[4] Bernard, A. and J.B. Jensen (2004), "Why some firms export", Review of Economics and Statistics, 86, 561-569.

[5] Bernard, A., S. Redding and P. Schott (2004), "Comparative Advantage and Heterogeneous Firms", NBER Working Paper 10668.

[6] Bertrand, O. and H. Zitouna (2005), "Trade Liberalization and Industrial Restructuring: The Role of Cross-Border Mergers and Acquisitions", Journal of Economics and Management Strategy, forthcoming.

[7] Besley, T. and R. Burgess (2003), "Halving Global Poverty", Journal of Economic Perspectives, 17(3), 3-22.

[8] Bjornvatn, Kjetil (2004), "Economic Integration and the Profitability of Cross-Border Mergers and Acquisitions", European Economic Review, 48, 1211-1226.

[9] Brealey, R. and S. Myers (2000), "Principles of Corporate Finance", McGraw-Hill.

[10] Cabral, L. and J. Mata (2001), "On the Evolution of the Firm Size Distribution: Facts and Theory", CEPR Discussion Paper 3045. Forthcoming, American Economic Review.

[11] Canadian Competition Bureau (1991), "Merger Enforcement Guidelines 1991", available at http://www.competitionbureau.gc.ca.

[12] Canadian Competition Bureau (2002), "Merger Enforcement Guidelines 2002", available at http://www.competitionbureau.gc.ca.

[13] Chudnovsky, D. (2000): "Industrial restructuring through mergers and acquisitions: The case of Argentina in the 1990s," Transnational Corporations, 9, 33-58.

[14] Davis, S., J. Haltiwanger, and S. Schuh (1996), "Job creation and destruction", MIT Press, Cambridge, Mass.

[15] di Giovanni, J. (2005), "What Drives Capital Flows? The Case of Cross-Border M&A Activity and Financial Deepening", Journal of International Economics, 65, 127-149.

[16] Dutz, M. (1989), "Horizontal Mergers in Declining Industries - Theory and Evidence", International Journal of Industrial Organization, 7, 11-33.

[17] Edwards, S. (1998), "Openness, Productivity and Growth: What Do We Really Know?", Economic Journal, 108, 383-398.

[18] Falvey, R., D. Greenaway and Z. Yu (2004), "Intra-Industry Trade between Asymmetric Countries with Heterogeneous Firms", GEP Research Paper 2004/05, University of Nottingham.

[19] Fernandes, A. (2003), "Trade Policy, Trade Volumes and Plant Level Productivity in Colombian Manufacturing Industries", World Bank Policy Research Working Paper 3064.

[20] Görg, Holger (2000), "Analysing Foreign Market Entry: The Choice between Greenfield Investment and Acquisitions", Journal of Economic Studies, 27(3), 473-486.

[21] Government of Canada, Department of Finance (1988), "Trade Barriers Between Canada and the United States", Department of Finance Working Papers.

[22] Greenaway, D., J. Gullstrand and R. Kneller (2005), "Surviving Globalisation", GEP Research Paper 2005/19, University of Nottingham.

[23] Gu, W., G. Sawchuk and L. Whewell (2003), "The Effect of Tariff Reductions on Firm Size and Firm Turnover in Canadian Manufacturing", Economic Analyis Research Paper 014, Statistics Canada.

[24] Gugler, K., D.C. Mueller and B.B. Yurtoglu (2004), "The Determinants of Merger Waves", mimeo, University of Vienna.

[25] Head, K. and J. Ries (1999), "Rationalization Effects of Tariff Reductions", Journal of International Economics, 47(2), 295-320.

[26] Horn, H., and L. Persson (2001): "The Equilibrium Ownership of an International Oligopoly," Journal of International Economics, 53, 307-333.

[27] Jensen, M. (1993), "The Modern Industrial Revolution, Exit, and Control Systems", Journal of Finance, 48, 831-880.

[28] Jovanovic, B. and P. Rousseau (2002), "The Q-Theory of Mergers," American Economic Review, 92, 198-204.

[29] Jovanovic, B. and P. Rousseau (2004), "Mergers as Reallocation", mimeo, Vanderbilt University.

[30] Lester, J. and T. Morehen (1987), "New Estimates of Canadian Tariff Rates by Industry and Commodity", Canadian Department of Finance Working Paper No. 88-2.

[31] Maksimovic, V. and G. Phillips (2001), "The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and Are There Efficiency Gains?", Journal of Finance, 56(6), 2019-2065.

[32] Melitz, M.J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", Econometrica, 71, 1695-1725.

[33] Melitz, M.J. and G.I.P. Ottaviano (2004), "Market Size, Trade, and Productivity", mimeo, Harvard University.

[34] Mitchell, M. and J. Mulherin (1996), "The Impact of Industry Shocks on Takeover and Restructuring Activity", Journal of Financial Economics, 41, 193-299.

[35] Morck, R., D. Strangeland and B. Yeung (1998), "Inherited Wealth, Corporate Control and Economic Growth: The Canadian Disease?", NBER Working Paper 6814.

[36] Mulherin, J. and A. Boone (2000), "Comparing Acquisitions and Divestitures", Journal of Corporate Finance, 6, 117-139.

[37] Nocke, V. and S. Yeaple (2004), "Mergers and the Composition of International Commerce", NBER Working Paper 10405.

[38] OECD (2001), "New Patterns of Industrial Globalisation: Cross-border mergers and acquisitions and strategic alliances", Organisation for Economic Co-operation and Development, Services and Trade group, Paris.

[39] Pavcnik, N, (2002), "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants", Review of Economics and Statistics, 69, 245-276.

[40] Roberts, M.J. and J.R. Tybout (1997), "What Makes Exports Boom?", Directions in Development Series, World Bank, Washington D.C.

[41] Rodríguez, F. and D. Rodrik (1999), "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence", NBER Working Paper No. 7081.

[42] Sachs, J. and A. Warner (1995), "Economic Reform and the Process of Global Integration", Brookings Papers on Economic Activity, 1-118.

[43] Topalova, P. (2004), "Trade Liberalization and Firm Productivity: The Case of India", IMF Working Paper 04/28.

[44] Trefler, D. (2004), "The Long and Short of the Canada-U.S. Free Trade Agreement", American Economic Review, 94(4), 870-895.

[45] Tybout, J.R., J. de Melo and V. Corbo (1991), "The Effects of Trade Reforms on Scale and Technical Efficiency", Journal of International Economcis, 31(3-4), 231-50.

[46] Tybout, J., 2001, Plant and Firm-Level Evidence on New Trade Theories, NBER Working Paper 8418, August 2001.

[47] Tybout, J.R. and Westbrook, M.D. (1995), "Trade Liberalization and the Dimensions of Efficiency Change in Mexican Manufacturing Industries", Journal of International Economics, 39(1-2), 53-78.

[48] Wooldridge, J.M. (1999), "Distribution-free Estimation of some nonlinear Panel Data Models", Journal of Econometrics, 90, 77-97.

[49] Wooldridge, J.M. (2002), "Econometric Analysis of Cross Section and Panel Data", MIT Press, Cambridge, Massachusetts.

A Theoretical Derivations

A.1 Entry- and Export Productivity Thresholds

Recall that only those firms will become active for which the sum of discounted future operating profits from serving the domestic market is at least equal to the setup costs Fi/δ. As noted in the text, these operating profits are given by $\pi_d(\varphi^*) = r_d(\varphi^*)/\delta = \left(pq - qi\varphi^{-1}\right)/\delta$. Thus, the productivity threshold for domestic entry φ^* must satisfy:

$$\frac{\pi_d(\varphi^*)}{\delta} = \frac{r_d(\varphi^*)}{\delta\sigma} = \frac{Fi}{\delta} \tag{9}$$

Similarly, at the export cutoff productivity of φ_x^* it will hold that:

$$\frac{\pi_x(\varphi_x^*)}{\delta} = \frac{r_x(\varphi_x^*)}{\delta\sigma} = \frac{F_x i}{\delta} \tag{10}$$

Following Melitz (2003), I now write the export cutoff productivity φ_x^* as a direct function of the entry cutoff φ^*. To do so, I use the fact that the ratio of revenues of the marginal domestic and the marginal exporting firm can be rewritten as a function of their relative productivities only (note that the M&A price i is identical in both countries due to the assumed symmetry). In particular, we have $r_x(\varphi_x^*) = \left(\frac{\sigma}{\sigma-1}\frac{\tau i}{\varphi_x^*}\right)^{1-\sigma} P^{\sigma-1}E_M$ and $r(\varphi^*) = \left(\frac{\sigma}{\sigma-1}\frac{i}{\varphi^*}\right)^{1-\sigma} P^{\sigma-1}E_M$ (where $E_M = s_M E$). We also know that $\frac{r_d(\varphi^*)}{\delta\sigma} = \frac{Fi}{\delta}$ and $\frac{r_x(\varphi_x^*)}{\delta\sigma} = \frac{F_x i}{\delta}$. Combining these equations yields: $\frac{r_x(\varphi_x^*)}{r_d(\varphi^*)} = \tau^{1-\sigma}\left(\frac{\varphi_x^*}{\varphi^*}\right)^{\sigma-1} = \frac{F_x}{F}$. From this it immediately follows that:

$$\varphi_x^* = \left(\frac{F_x}{F}\right)^{1/(\sigma-1)} \tau\varphi^* \tag{11}$$

From (11) it is clear that the only firm-level characteristic that determines the export status of a firm in this model is its level of productivity φ. Also, since every firms that wants to export has to incur the domestic setup cost Fi/δ as well, an exporter will always also sell on the domestic market. That is, it will hold that $\varphi_x^* \geq \varphi^*$.[39] On the other hand, there will be a separation into exporters and non-exporters as long as $\left(\frac{F_x}{F}\right)^{1/(\sigma-1)}\tau > 1$. Since there is strong evidence that such a separation is an empirically relevant phenomenon (e.g. Bernard and Jensen, 2004), I assume in the following that the this condition is satisfied and that it thus holds that $\varphi_x^* > \varphi^*$. That is, exporting firms are always more productive than non-exporting firms.

Returning to the entry threshold (9), I can substitute for domestic revenues r_d and write φ^* as:

$$\varphi^* = \left[\frac{i^\sigma F\sigma^\sigma}{E_M P^{\sigma-1}(\sigma-1)^{\sigma-1}}\right]^{1/(\sigma-1)}$$

With the assumption of Pareto-distributed productivities (i.e. $v(\varphi) = a\kappa^a\varphi^{-(a+1)}$ with $\kappa > 0$,

[39] This might seem puzzling in view of condition (11) which seems to imply that $\varphi_x^* < \varphi^*$ for low enough values of $\frac{F_x}{F}$. However, note that φ_x^* is the export threshold for a firm that has already entered the domestic market (the setup costs Fi/δ are not included in the condition determining φ_x^*: $\frac{r_x(\varphi_x^*)}{\delta\sigma} = \frac{F_x i}{\delta}$).

$a > \sigma - 1 > 0$, and $\varphi \geq \kappa$) and after some algebraic manipulations, I can explicitly solve for φ^* as:

$$\varphi^* = \left[\frac{\sigma a k^a}{a - \sigma + 1} M_e \frac{F}{E_M} i\right]^{1/a} \left[1 + \tau^{-a} \left(\frac{F_x}{F}\right)^{\frac{\sigma-1-a}{\sigma-1}}\right]^{1/a} \tag{12}$$

A.2 Capital Demand and Prices

With Pareto-distributed productivities, variable capital demand for domestic production and exporting at active firms can be written as:

$$k_d(\varphi) = \left[\frac{\sigma}{\sigma - 1} i\right]^{-\sigma} \varphi^{\sigma-1} P^{\sigma-1} E_M = (\sigma - 1) F \left(\frac{\varphi}{\varphi^*}\right)^{\sigma-1}$$

$$k_x(\varphi) = \left[\frac{\sigma}{\sigma - 1} i\tau\right]^{-\sigma} \varphi^{\sigma-1} P^{\sigma-1} E_M = \tau^{1-\sigma} (\sigma - 1) F \left(\frac{\varphi}{\varphi^*}\right)^{\sigma-1}$$

Integrating over all active firms and using the solutions for φ^* and φ_x^* from the last section, I can determine overall capital demand for domestic production and exporting as:

$$K_d = \int_{\varphi=\varphi^*}^{\infty} \left(k_d(\varphi) + F\right) M_e d\varphi = \frac{E_M}{i} \left(\frac{a\sigma - \sigma + 1}{\sigma a}\right) \left[1 + \tau^{-a} \left(\frac{F_x}{F}\right)^{\frac{\sigma-a-1}{\sigma-1}}\right]^{-1} \tag{13}$$

and

$$K_x = \int_{\varphi=\varphi_x^*}^{\infty} \left(k_x(\varphi) + F_x\right) M_e d\varphi = \frac{E_M}{i} \left(\frac{a\sigma - \sigma + 1}{\sigma a}\right) \left[1 + \tau^{a} \left(\frac{F_x}{F}\right)^{\frac{\sigma-a-1}{1-\sigma}}\right]^{-1} \tag{14}$$

Finally, using the the M&A market clearing condition $K_d + K_x = K$, I can solve for i as:

$$i = \left(\frac{a\sigma - \sigma + 1}{\sigma a}\right) \frac{E_M}{K}$$

Pluggin this result back into (13) and (14), I obtain the results for K_d and K_x presented in the main text.

B Linking Tariff and M&A Data

The tariff data are constructed as described in Head and Ries (1999). U.S. tariffs prior to CUSFTA are taken from Government of Canada (1988), Canadian tariffs from Lester and Morehen (1987). These publications provide tariffs for around 100 industries, roughly corresponding to the 3-digit level of the Canadian industry classification of 1980 (CAN-SIC80) Subsequent tariff reductions are calculated by determining to which so-called 'staging' category an industry had been assigned under CUSFTA. The staging category agreed upon determined the rate by which tariff protection was being phased out. Most industries had their tariffs reduced in equal parts from 1989 to 1997. A smaller number were placed on a five year phase-out and a handful opted for immediate elimination.

In order to link these tariff data to the data on M&A transactions, I assign each M&A deal to a 4-digit category of the 1987 U.S. industry classification (US-SIC87) based on the primary field of activity of the target company or division. In order to determine the tariff facing that industry, I use a correspondance between CAN-SIC80 and US-SIC87 provided by Statistics Canada. The mapping was unique in about 70% of cases in the sense that a U.S.-industry was matched to a unique tariff rate. For the remaining 30%, I used averages of tariffs weighted according to the average number of establishments in the CAN-SIC80 category (this arguably captures the 'M&A potential' of an industry better than e.g. value added or output weights would do: ceteris paribus, a transaction is more likely to occur in an industry with more establishments; however, using simple averages does not qualitatively affect my results). Finally, I aggregated the U.S.-data up to the 3-digit level (140 industries), again using the number of firms in a 4-digit category as tariff weights. This aggregation was done in order to reduce the number of zero-transaction categories (which drop out in fixed-effects Poisson regressions) and to reflect more accurately the less disaggregated nature of the underlying tariff data.

C Figures and Tables

Table 1: Descriptive Statistics on Target Industries

U.S.-SIC87 (2-digit)	Industry Name	Total No. of Acquisitions 1985-1997 (1) U.S. by U.S.	(2) U.S. by CAN	(3) CAN by U.S.	(4) CAN by CAN	(5) #Establishments (U.S.)	(6) #Establishments (Canada)	(7) Avg. U.S. import tariff in 1988	(8) Avg. Can. import tariff in 1988
20	Food and kindred products	1497	46	52	219	20,749	3,440	3.9%	5.9%
21	Tobacco manufactures	40	0	0	2	119	20	20.7%	14.4%
22	Textile mill products	385	11	16	37	6,035	757	8.7%	13.5%
23	Apparel and other textile products	478	8	11	16	23,224	2,604	9.4%	15.8%
24	Lumber and wood products	257	15	14	90	22,665	3,110	2.2%	4.5%
25	Furniture and fixtures	314	3	2	32	11,796	1,927	2.2%	10.7%
26	Paper and allied products	531	30	19	125	6,401	818	3.4%	8.8%
27	Printing and publishing	1873	69	30	209	63,179	5,425	0.5%	2.0%
28	Chemicals and allied products	2550	70	65	135	12,138	1,204	3.8%	6.2%
29	Petroleum and coal products	216	9	8	21	2,168	140	0.7%	0.8%
30	Rubber and misc. plastics products	819	27	31	64	15,774	1,607	4.5%	8.8%
31	Leather and leather products	121	0	3	4	2,026	320	7.5%	12.6%
32	Stone, clay, glass, and concrete products	389	15	20	42	16,279	1,612	1.8%	3.9%
33	Primary metal industries	749	21	38	73	6,479	515	3.4%	4.5%
34	Fabricated metal products	1076	38	38	82	36,835	3,236	2.2%	7.0%
35	Industrial machinery and equipment	2843	72	98	189	54,143	4,635	2.6%	5.2%
36	Electrical and electronic equipment	2657	71	87	162	16,649	988	3.5%	6.3%
37	Transportation equipment	999	24	36	87	11,393	1,256	0.9%	5.5%
38	Instruments and related products	2254	30	39	53	11,091	987	4.2%	7.0%
39	Miscellaneous manufacturing industries	612	17	15	21	17,217	1,720	3.8%	6.2%
	Total (sum or mean)	20660	576	622	1663	356,362	36,320	4.5%	7.5%

Notes: Columns 1-4 show the total number of takeover of firms with primary activity in manufacturing (SIC 20-39) during 1985-1997. The columns give figures by two-digit industry for four different M&A categories: 1) Takeovers of U.S. firms by other U.S. firms; 2) takeovers of U.S. firms by Canadian firms; 3) takeovers of Canadian firms by U.S. firms; and 4) takeovers of Canadian firms by Canadian firms. Acquirers can have primary activity within or outside manufacturing (see table 2 for a breakdown of acquirers' primary industries). Columns 5 and 6 display the average number of establishments in 1985-1997 for the U.S. and Canada. Columns 7 and 8 show two-digit average import tariffs levied by the U.S. and Canada on each other's manufacturing products in 1988.

Table 2: Descriptive Statistics on Acquirer Industries

	United States				Canada			
Sector	(1) Number	(2) % of total manufacturing M&A	(3) secondary SIC in manuf. (% of SIC)	(4) at least one 3-digit SIC-code in common with target (% of SIC)	(5) Number	(6) % of total manufacturing M&A	(7) secondary SIC in manuf. (% SIC)	(8) at least one 3-digit SIC-code in common with target (% of SIC)
Manufacturing firms (SIC 2-3)	14878	70.1%	100.0%	55.0%	1583	69.3%	100.0%	58.5%
- Same 3-digit industry	7168	33.8%	100.0%	100.0%	831	36.4%	100.0%	100.0%
- Same 2-digit industry but not same 3-digit industry	2808	13.2%	100.0%	13.0%	303	13.3%	100.0%	15.9%
- Different 2-digit industries	4902	23.1%	100.0%	8.5%	449	19.6%	100.0%	4.7%
Non-manufacturing firms	3555	16.7%	26.1%	3.0%	472	20.7%	22.6%	2.7%
- Agriculture, Fishing & Hunting (sic 1)	69	0.3%	50.7%	5.8%	10	0.4%	50.0%	10.0%
- Mining (sic 10-14)	260	1.2%	29.7%	1.1%	65	2.8%	10.6%	0.0%
- Construction (sic 15-17)	96	0.5%	32.3%	2.1%	8	0.4%	50.0%	0.0%
- Transportation, communications, and utilities (sic 4)	417	2.0%	28.1%	2.4%	62	2.7%	45.2%	0.0%
- Wholesale trade (sic 50-51)	713	3.4%	36.7%	6.2%	77	3.4%	24.7%	5.2%
- Retail Trade (sic 52-59)	206	1.0%	17.5%	3.9%	24	1.1%	20.8%	4.2%
- Finance, insurance, and real estate (sic 60-67)	693	3.3%	10.1%	0.1%	140	6.1%	1.4%	0.0%
- Services industry (sic 7/8)	1078	5.1%	27.6%	3.1%	86	3.8%	43.0%	8.1%
- Government (sic 9)	23	0.1%	0.0%	0.0%	14	0.6%	0.0%	0.0%
Investors, n.e.c (sic 6799)	2803	13.2%	0.0%	0.0%	216	9.5%	0.0%	0.0%
Total number of manufacturing M&A	21236	100.0%			2285	100.0%		

Notes: Columns (1) and (5) show total number of M&A transactions involving manufacturing targets in the U.S. and Canada with acquirers having their principal activity in the SIC-code listed on the left. Columns (2) and (6) express these numbers as % of the total number of manufacturing M&A transaction in the respective country. Columns (3) and (7) list the fraction of acquirers from a given SIC-code that have a primary OR secondary three-digit SIC-code in manufacturing. Columns (4) and (8) similarly list the fraction of acquirers that have at least one three-digit manufacturing SIC-code (primary or secondary) in common with the target.

Table 3: Impact of tariff reductions on number of M&A transactions - Full Sample

Measure of tariff cuts (Δ)		Dependent Variable: Number of Takeovers												Controls
		1) Canada by Canada			2) U.S. by Canada			3) U.S. by U.S.			4) Canada by U.S.			
		β_{CbyC}	d_{post}	Obs.	β_{UbyC}	d_{post}	Obs.	β_{UbyU}	d_{post}	Obs.	β_{CbyU}	d_{post}	Obs.	
(1)	$\Delta = \log(t_{1988}-t_{1997})$	0.365	2.887	230	0.103	1.121	188	0.068	0.752	270	0.076	1.755	206	No
		(4.18)**	(10.14)**		(0.97)	(2.81)**		(3.68)**	(11.17)**		(0.45)	(3.41)**		
(2)	$\Delta = t_{1988}-t_{1997}$	8.310	1.295	234	6.940	0.448	192	0.979	0.471	274	-6.561	1.941	210	No
		(3.58)**	(10.04)**		(1.52)	(2.98)**		(1.89)+	(19.45)**		(1.80)+	(7.89)**		
(3)	$\Delta = 1(dt>dt_{,50\%})$	0.370	1.554	234	0.479	0.417	192	0.224	0.380	274	-0.250	1.681	210	No
		(2.77)**	(18.52)**		(3.01)**	(3.87)**		(8.74)**	(20.16)**		(1.23)	(11.02)**		
(4)	$\Delta = \log(t_{1988}-t_{1997})$	0.364	2.871	230	0.090	0.787	188	0.069	0.708	270	0.119	1.698	206	Yes
		(4.12)**	(9.15)**		(0.85)	(1.85)+		(3.71)**	(10.07)**		(0.67)	(2.93)**		
(5)	$\Delta = t_{1988}-t_{1997}$	8.419	1.265	234	6.885	0.137	192	1.224	0.434	274	-6.598	1.811	210	Yes
		(3.57)**	(7.47)**		(1.53)	(0.70)		(1.84)+	(11.98)**		(1.78)+	(7.04)**		
(6)	$\Delta = 1(dt>dt_{,50\%})$	0.380	1.512	234	0.452	0.149	192	0.224	0.368	274	-0.232	1.530	210	Yes
		(2.83)**	(13.56)**		(2.82)**	(0.92)		(8.72)**	(13.43)**		(1.14)	(8.43)**		

Notes: Table shows coefficient estimates from fixed-effects Poisson regressions with conditional mean $\mu_{it}=\exp(d_i+d_{pre}+d_{post}+\beta*d_{post}*\Delta)$. Figures in brackets below coefficient estimates are robust t-stats based on standard errors clustered at the industry level. The dependent variable (μ_{it}) is the number of takeovers of manufacturing firms per 3-digit industry and time-period (pre-CUSFTA and post-CUSFTA). The regressors are transformations of the absolute change in industry tariffs 1988-1997, interacted with a post-CUSFTA period-dummy ($d_{post}*\Delta$): lines 1 and 4 use logs of absolute changes, lines 2 and 5 use absolute changes and lines 3 and 6 use a binary indicator (= 1 if an industry is among the 50% of industries with the highest tariff cuts). Coefficient estimates for these tariff change variables are listed under the first column of each M&A category (columns containing βs). The four categories included are: 1) takeovers of Canadian firms by other Canadian firms; 2) takeovers of U.S. firms by Canadian firms; 3) takeovers of U.S. firms by other U.S. firms; and 4) takeovers of Canadian firms by U.S. firms. All regressions also include industry fixed effects (d_i) and a period-dummy for the post-FTA period (estimates shown under the columns with the heading "d_{post} "). The excluded category is the pre-CUSFTA period dummy d_{pre}. Regressions 4-6 additionally contain the number of takeovers in the EU in the same industry and time-period (see text for details). +, * and ** indicate statistical significance at the 10%, the 5% and the 1%-level, respectively.

Table 4: Impact of tariff reductions on number of M&A transactions - Subsamples

		Dependent Variable: Number of Takeovers												
	Measure of tariff cuts (Δ)	1) Canada by Canada			2) U.S. by Canada			3) U.S. by U.S.			4) Canada by U.S.			Controls
		β_{CbyC}	d_{post}	Obs.	β_{UbyC}	d_{post}	Obs.	β_{UbyU}	d_{post}	Obs.	β_{CbyU}	d_{post}	Obs.	
Excluding SIC6799 (n.e.c.)	(1) $\Delta = \log(t_{1988}-t_{1997})$	0.311	2.613	220	0.152	1.093	186	0.045	0.693	270	0.320	2.706	192	Yes
		(3.21)**	(7.56)**		(1.40)	(2.43)*		(1.83)+	(8.50)**		(1.74)+	(4.32)**		
	(2) $\Delta = t_{1988}-t_{1997}$	8.194	1.220	224	12.156	0.031	190	0.772	0.556	274	-3.294	1.907	196	Yes
		(3.20)**	(6.72)**		(2.46)*	(0.15)		(0.99)	(13.14)**		(0.82)	(6.05)**		
	(3) $\Delta = 1(dt>dt_{50\%})$	0.411	1.537	224	0.486	0.179	190	0.176	0.494	274	-0.144	1.781	196	Yes
		(2.79)**	(12.04)**		(2.81)**	(1.04)		(5.97)**	(15.54)**		(0.67)	(7.83)**		
Excluding acq. of minority interest	(4) $\Delta = \log(t_{1988}-t_{1997})$	0.422	2.878	228	0.045	0.741	184	0.023	0.506	270	0.246	2.365	202	Yes
		(4.50)**	(8.54)**		(0.39)	(1.60)		(1.18)	(6.72)**		(1.30)	(3.78)**		
	(5) $\Delta = t_{1988}-t_{1997}$	9.135	1.021	232	5.421	0.262	188	-0.256	0.442	274	-4.733	1.919	206	Yes
		(3.48)**	(5.47)**		(1.11)	(1.22)		(0.36)	(11.40)**		(1.19)	(5.94)**		
	(6) $\Delta = 1(dt>dt_{50\%})$	0.461	1.384	232	0.329	0.279	188	0.170	0.343	274	-0.175	1.712	206	Yes
		(3.05)**	(10.61)**		(1.87)+	(1.55)		(6.14)**	(11.66)**		(0.81)	(7.45)**		
Within-industry acq. only	(7) $\Delta = \log(t_{1988}-t_{1997})$	0.362	2.787	172	-0.573	-2.300	110	0.032	0.812	262	0.592	3.462	130	Yes
		(2.30)*	(5.05)**		(1.48)	(1.56)		(0.94)	(6.19)**		(1.74)+	(3.05)**		
	(8) $\Delta = t_{1988}-t_{1997}$	7.385	1.223	176	24.876	-1.162	114	1.645	0.660	266	-1.135	1.706	132	Yes
		(1.78)+	(4.07)**		(2.50)*	(2.72)**		(1.79)+	(9.39)**		(0.14)	(2.82)**		
	(9) $\Delta = 1(dt>dt_{50\%})$	0.384	1.521	176	0.365	-0.653	114	0.294	0.561	266	-0.602	1.950	132	Yes
		(1.66)+	(7.40)**		(1.04)	(1.80)+		(6.20)**	(10.48)**		(1.61)	(4.76)**		
Publicly traded companies only	(10) $\Delta = \log(t_{1988}-t_{1997})$	0.348	2.903	216	0.167	1.232	180	0.140	1.310	268	0.408	3.553	172	Yes
		(2.99)**	(5.80)**		(1.29)	(2.37)*		(5.28)**	(12.91)**		(1.54)	(3.87)**		
	(11) $\Delta = t_{1988}-t_{1997}$	8.715	1.934	220	19.963	-0.097	184	2.518	0.731	272	3.117	2.102	176	Yes
		(2.52)*	(7.70)**		(3.42)**	(0.43)		(2.47)*	(13.69)**		(0.47)	(4.64)**		
	(12) $\Delta = 1(dt>dt_{50\%})$	0.368	2.298	220	0.766	0.156	184	0.254	0.705	272	0.219	2.175	176	Yes
		(1.91)+	(12.79)**		(4.04)**	(0.86)		(6.93)**	(17.75)**		(0.77)	(7.08)**		

Notes: Table shows coefficient estimates from fixed-effects Poisson regressions with conditional mean $\mu_{it}=\exp(d_i+d_{pre}+d_{post}+\beta*d_{post}*\Delta)$. Figures in brackets below coefficient estimates are robust t-stats based on standard errors clustered at the industry level. The dependent variable (μ_{it}) is the number of takeovers of manufacturing firms per 3-digit industry and time-period (pre-CUSFTA and post-CUSFTA). The table displays results for four different subsamples of manufacturing targets (see first table column and text for details). The regressors are transformations of the absolute change in industry tariffs 1988-1997, interacted with a post-CUSFTA period-dummy ($d_{post}*\Delta$): lines 1, 4, 7 and 10 use logs of absolute changes, lines 2, 5, 8 and 11 use absolute changes and lines 3, 6, 9 and 12 use a binary indicator (= 1 if an industry is among the 50% of industries with the highest tariff cuts). Coefficient estimates for these tariff change variables are listed under the first column of each M&A category (columns containing βs). The four categories included are: 1) takeovers of Canadian firms by other Canadian firms; 2) takeovers of U.S. firms by Canadian firms, 3) takeovers of U.S. firms by other U.S. firms, and 4) takeovers of Canadian firms by U.S. firms. All regressions also include industry fixed effects (d_i) and a period-dummy for the post-FTA period (estimates shown under the columns with the heading "d_{post} "). The excluded category is the pre-CUSFTA period (d_{pre}). Regressions 4-6 additionally contain the number of takeovers in the EU in the same industry and time-period (see text for details). +, * and ** indicate statistical significance at the 10%, the 5% and the 1%-level, respectively.

Table 5: Comparison Acquirers – Targets

Specifi-cation	Regressors	(1) Net Sales (Mio 1995 USD)	(2) Employees ('000s)	(3) Pretax income per employee ('000 USD)	(4) Pretax income per net sales (USD)	(5) Labor product. (logs of '000 USD per employee)	Year dummies?	Three-digit industry dummies?
(1)	Constant	970.057	11.112	9.168	0.052	4.899	Yes	No
		(12.24)**	(11.36)**	(6.24)**	(6.62)**	(130.61)**		
	Target dummy	-882.693	-8.508	-14.657	-0.096	-0.120		
		(11.91)**	(9.94)**	(5.58)**	(7.92)**	(5.08)**		
	R-squared	0.14	0.09	0.14	0.12	0.06		
(2)	Constant	754.028	9.406	9.712	0.058	4.907	Yes	No
		(5.79)**	(4.76)**	(4.09)**	(5.38)**	(80.18)**		
	Target dummy	-640.033	-5.199	-11.012	-0.087	-0.145		
		(4.90)**	(2.59)*	(3.14)**	(6.08)**	(2.77)**		
	acqu*US	234.258	1.872	-0.533	-0.007	-0.009		
		(1.56)	(0.87)	(0.28)	(0.75)	(0.17)		
	target*US	-28.733	-1.613	-4.347	-0.016	0.017		
		(1.47)	(2.30)*	(1.51)	(1.46)	(0.28)		
	R-squared	0.14	0.10	0.14	0.12	0.06		
(3)	Constant	876.090	10.924	2.742	0.049	4.682	Yes	Yes
		(5.09)**	(4.80)**	(1.09)	(3.74)**	(90.62)**		
	Target dummy	-501.366	-3.942	-10.576	-0.085	-0.126		
		(3.35)**	(2.09)*	(2.85)**	(6.05)**	(2.69)**		
	acqu*US	460.773	4.214	1.743	0.005	0.070		
		(2.69)**	(1.86)+	(0.88)	(0.53)	(1.67)+		
	target*US	89.035	-0.128	-2.791	-0.006	0.104		
		(2.12)*	(0.11)	(0.92)	(0.53)	(1.87)+		
	R-squared	0.27	0.25	0.20	0.17	0.33		
	Observations	12613	9080	5566	7049	8466		

Notes: Table shows results for OLS regressions (robust t-values in parentheses are based on standard errors clustered at the 3-digit industry level). The dependent variables are the company characteristics listed across the top of columns 1-5. Regressors include a constant, a dummy for whether a company is a target and interaction terms for U.S. companies (acqu*US for U.S. acquirers and target*US for U.S. targets). Also included are year fixed-effects (all specifications) and 3-digit industry fixed-effects (specification 3 only). +, * and ** indicate statistical significance at the 10%, the 5% and the 1%-level, respectively.

Table 6: Statistical significance of differences in target and acquirer characteristics (based on estimates from table 5)

Based on which specification of table 5?	Comparison	Difference acquirers-targets positive and significant?				
		Net sales	Employees	Pretax income per employee	Pretax income per net sales	Labor Productivity
1) Year fixed effects only (specification 2)	Canadian targets vs. Canadian acquirers	Yes (24.03)**	Yes (6.71)*	Yes (9.86)**	Yes (36.97)**	Yes (7.66)**
	U.S. targets vs. U.S. acquirers	Yes (126.87)**	Yes (92.32)**	Yes (31.45)**	Yes (58.75)**	Yes (24.11)**
	Canadian targets vs. U.S. acquirers	Yes (127.73)**	Yes (40.13)**	Yes (8.07)**	Yes (51.33)**	Yes (5.78)*
	U.S. targets vs. Canadian acquirers	Yes (27.03)**	Yes (12.66)**	Yes (26.47)**	Yes (49.84)**	Yes (4.54)*
2) Year and industry fixed effects (specification 3)	Canadian targets vs. Canadian acquirers	Yes (11.22)**	Yes (4.35)*	Yes (8.13)**	Yes (36.65)**	Yes (7.21)**
	U.S. targets vs. U.S. acquirers	Yes (100.12)**	Yes (51.55)**	Yes (27.24)**	Yes (51.44)**	Yes (20.78)**
	Canadian targets vs. U.S. acquirers	Yes (90.47)**	Yes (36.80)**	Yes (9.19)**	Yes (48.59)**	Yes (13.32)**
	U.S. targets vs. Canadian acquirers	Yes (6.91)**	Yes (3.31)+	Yes (21.23)**	Yes (42.80)**	No (0.23)
	Observations	12613	9080	5566	7049	8466

Notes: Table shows results of F-tests on differences between acquirer and target characteristics based on dummy estimates from table 5, specifications 2-3. For example, line 3 in both blocks (1) and (2) tests $\alpha+\beta_1=\alpha+\beta_3$ (see text for full econometric specifications). "Yes" indicates a positive and statistically significant difference in coefficient estimates (F-stats in parentheses, +, * and ** indicate statistical significance at the 10%, 5% and the 1%-level, respectively).

Table 7: Firm exit via M&A and Bankruptcy

	Canada		United States		Total	
Firms active in part or all of 1985-1997	331		5816		6147	
Firms exiting (% of total)	43	13.0%	1606	27.6%	1649	26.8%
- Bankruptcy/Liquidation (% of total exit)	4	9.3%	287	17.9%	291	17.6%
- M&A (% of total exit)	39	90.7%	1319	82.1%	1358	82.4%

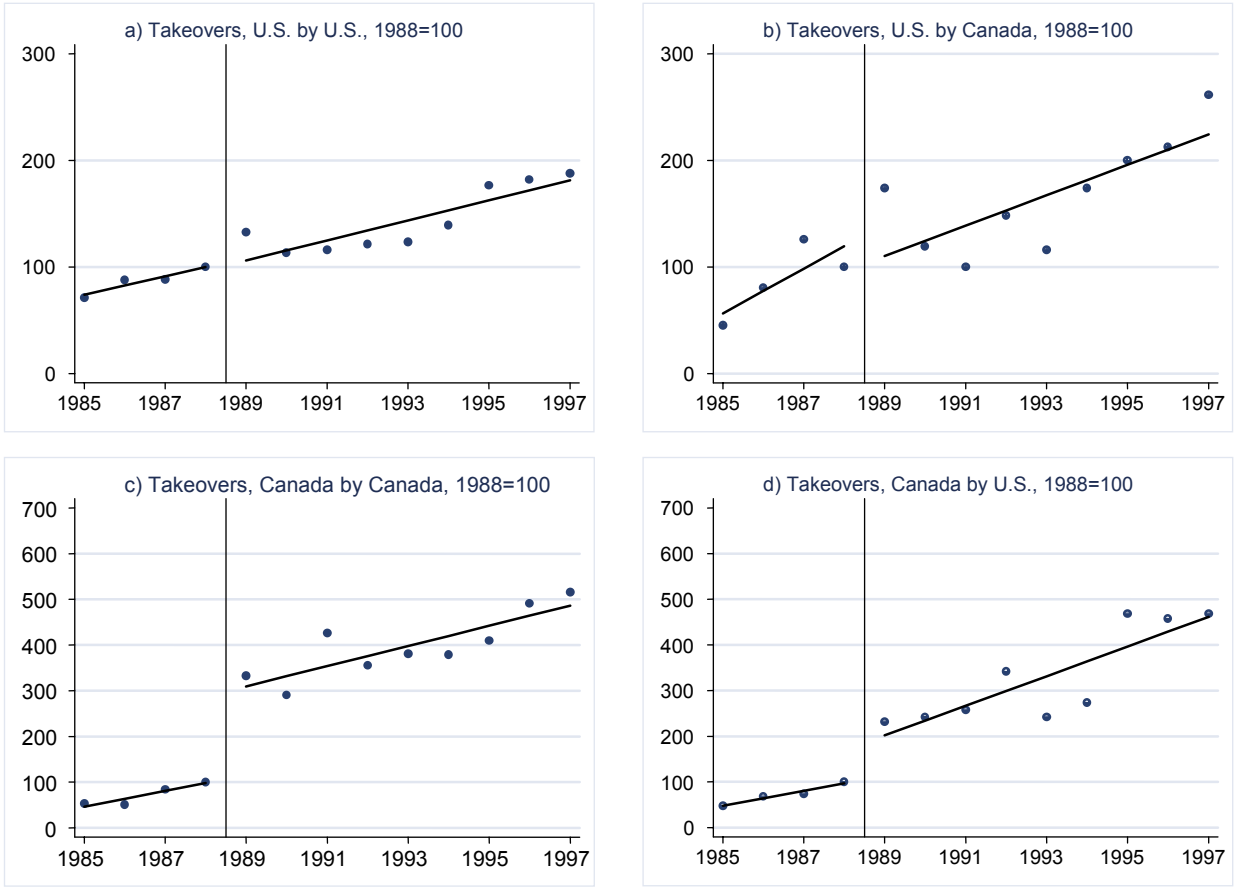
Notes: Table shows numbers of publicly traded manufacturing firms active in all or part of 1985-1997 and total occurences of exit via M&A or bankruptcy among these firms.

Table 8: Reallocation via Contraction, M&A and Bankruptcy

Yearly Sample Averages 1985-1997	Canada	United States	Total
Total employment ('000s)	757.1	15570.2	16327.3
Gross job losses at continuing firms ('000s)	32.5	745.0	777.6
Job losses through bankruptcy/liquidation ('000s)	0.5	11.2	11.6
Job transfers through M&A ('000s)	14.3	263.3	277.6
Total job reallocation ('000s)	47.3	1019.5	1066.8
Total job reallocation as % of employment	6.2%	6.5%	6.5%
M&A % of total job reallocation	30.2%	25.8%	26.0%
Total output (mill. 1995 USD)	156,764	3,017,341	3,174,105
Gross output reductions at continuing firms (mill. 1995 USD)	7,159	96,636	103,795
Output reductions through bankruptcy/liquidation (mill. 1995 USD)	101	1,374	1,476
Output transfers through M&A (mill. 1995 USD)	3,812	42,744	46,556
Total output reallocation (mill. 1995 USD)	11,869	140,754	152,623
Total reallocation as % of output	7.6%	4.7%	4.8%
M&A % of total output reallocation	32.1%	30.4%	30.5%

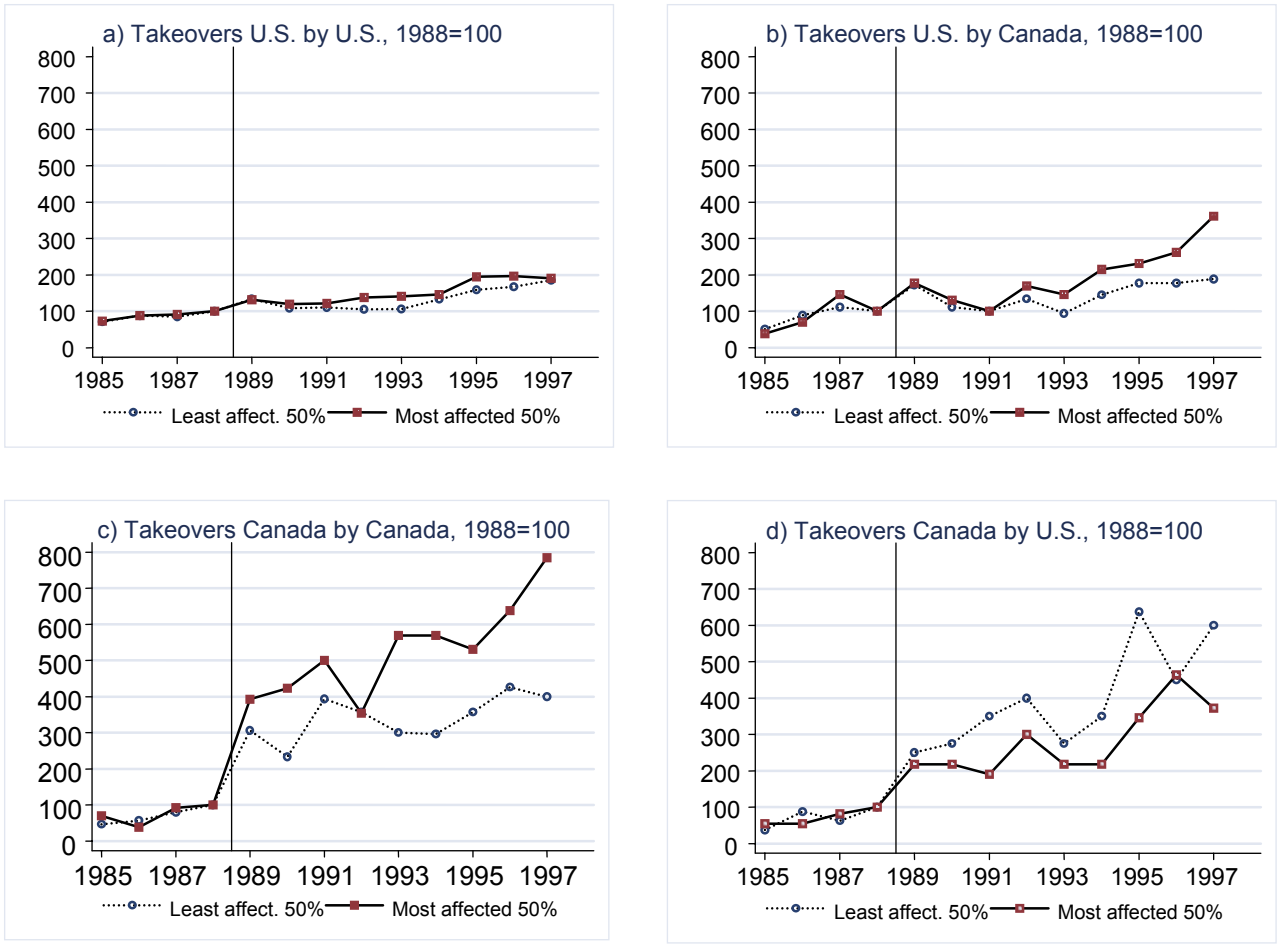
Notes: Table shows the amount of job and output reallocation via contraction at continuing firms and via exit by bankruptcy/liquidation and M&A. "Total employment" and "Total output" are obtained by summing over all firms active in a given year. "Gross job losses/output reductions at continuing firms" are the sum over all employment/output reductions at continuing firms as compared to the previous year. "Job losses/output reductions through bankruptcy/liquidation" and "Job/output transfers through M&A" are the sum over the last available employment/sales figures for firms exiting the dataset in a given year due to bankruptcy/liquidation or M\&A (see text for details on the sample construction).

Figure 1: Aggregate Number of M&A Transactions, 1985-1997



Notes: Figures show the number of takovers of firms with primary activity in manufacturing, expressed as indices relative to 1988. Acquirers can have primary activities within or outside manufacturing (see table 2 for a breakdown of acquirers' primary industries). The four graphs give numbers for four M&A categories: a) U.S. firms taken over by other U.S. firms, b) U.S. firms taken over by Canadian firms, c) Canadian firms taken over by other Canadian firms, and d) Canadian firms taken over by U.S. firms.

Figure 2: Aggregate Number of M&A Transactions, Most vs. Least Affected Industries



Notes: Figures show the number of takovers of firms with primary activity in manufacturing, expressed as indices relative to 1988. Acquirers can have primary activities within or outside manufacturing (see table 2 for a breakdown of acquirers' primary industries). Each graph shows numbers for two groups of target industries: the 50% of industries with the highest and the 50% of industries with the lowest cuts in domestic tariffs from 1988-1997. The four graphs give numbers for four M&A categories: a) U.S. firms taken over by other U.S. firms, b) U.S. firms taken over by Canadian firms, c) Canadian firms taken over by other Canadian firms, and d) Canadian firms taken over by U.S. firms.