CROSS-BORDER MERGERS & ACQUISITIONS AND THE ROLE OF TRADE COSTS

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Abstract

Cross-border mergers and acquisitions (M&As) have increased dramatically over the last two decades. This paper analyses the role of trade costs in explaining the increase in the number of cross-border mergers and acquisitions. In particular, we distinguish horizontal and non-horizontal M&As and investigate whether trade costs affect these two types of mergers differently. We analyse this question using industry data for 23 OECD countries for the period 1990-2001. Our findings suggest that while in the aggregate trade costs affect cross-border merger activity negatively its impact differs importantly across horizontal and non-horizontal mergers. The impact of trade costs is less negative for horizontal mergers, which is consistent with the tariff-jumping argument.

Keywords: mergers and acquisitions , trade costs, gravity, FDI

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1. Introduction

Cross-border mergers and acquisitions (M&As) have increased dramatically over the last two decades. In 1999, the value of completed cross-border M&As world-wide was around $720 billion. The value of all M&As, both cross-border and domestic, amounted to an equivalent of 8 percent of world GDP in the same year, compared to 0.3 percent in 1980 (UN 2001). Also, over that period, most of the growth in foreign direct investment flows (FDI) has been attributed to M&As rather than greenfield investment (UN 2001). Given this rapid increase, fully understanding the determinants and implications of international mergers and acquisitions has been high on the agenda for both policy makers and academics.

There has been a long tradition in international economics of analysing the determinants of FDI. This literature generally does not distinguish between FDI through M&A or greenfield investment. Traditionally, much of the FDI activity has been explained by the "tariff-jumping" argument. In a nutshell, this explanation posits that exporting and investing abroad are alternative modes to enter foreign markets. As trade costs increase and exporting becomes more costly, firms are more likely to choose investing abroad. These ideas have been formalised in theoretical models by, e.g., Brainard (1997) and Markusen (2002), while Brainard (1997), Carr et al. (2001) and Blonigen et al. (2003) provide empirical evidence.[1]

Another strand of literature has recently investigated the determinants of international M&A activity from a more industrial organization (IO) oriented background. Interestingly this has brought to the fore a different view on the importance of trade costs. For example, Horn and Persson (2001), Bjorvatn (2004) and Norbäck and Persson (2004) provide

[1] However, see Motta (1992) for a theoretical paper that shows that strategic behaviour can invalidate the tariff-jumping argument.

theoretical models where foreign firms may acquire domestic acquisition targets, with the acquisition price being determined endogenously in a bargaining process. In these models, contrary to the tariff-jumping argument, high trade costs do not necessarily induce cross-border M&As. High trade costs not only encourage tariff-jumping mergers, but also increase the incentives for domestic mergers as they reduce the degree of competition in the domestic market thereby increasing the acquisition price domestic acquirers are prepared to pay for domestic targets ('pre-emptive' domestic mergers). Furthermore, Neary (2007) develops a model of mergers in a two-country oligopoly in general equilibrium. His analysis also suggests that trade liberalisation can lead to increased cross-border mergers.[2]

The present paper is motivated by two empirical observations. First, in reality, as we show in Section 2, much of international M&A activity involves mergers between firms in different industries, which one could arguably define as vertical and/or conglomerate mergers.[3] The theories discussed above however refer explicitly to horizontal mergers. Consequently, it does not seem implausible that the role of trade costs differs across horizontal and non-horizontal mergers.

Second, the ambiguity in the literature discussed above with respect to the role of trade costs in explaining cross-border M&A arises in an international oligopoly of two countries. In a world with more than two countries the market access motivation, which gives rise to tariff-jumping, and the market power motivation, which drives 'pre-emptive' domestic mergers, can no longer be considered two sides of the same coin, i.e. the bilateral tariff.

[2] See also Ben-Ishai (2004), Breinlich (2006), Bertrand and Zitouna (2006) and Tekin Koru (2004) for related papers on the relationship between trade liberalization and M&As.
[3] Andrade *et al.* (2001) observe that most merger activity in the 1990s is by firms within the same industry. However, this observation is based on the total number of mergers, which for the most part consists of domestic mergers. As we will show in Section 2 the share of cross-industry mergers is much larger for cross-border mergers than for domestic mergers.

While market access continues to be a function of the bilateral tariff market concentration becomes a function of the degree of foreign competition more generally, also taking account of third countries. The smaller the degree of foreign competition the larger will be the incentive to merge for domestic firms. In an empirical setting with more than two countries the ambiguity in the literature in the relationship between trade costs and M&As therefore tends to disappear.[4]

In the present paper we empirically analyse the role of trade costs in explaining cross-border M&A.[5] As Anderson and Van Wincoop (2005) show the role of trade costs in determining international exchanges of capital and goods is far from negligible despite the increasingly globalized world economy.[6] Micro data with detailed information on the number and value of international merger deals are obtained from the Thomson Financial Securities *Global Mergers and Acquisitions* database. We use this information to construct a comprehensive dataset at the industry level for 23 OECD countries for the period 1990-2001.

In order to capture the fact that the tariff-jumping argument and the pre-emptive merger motive discussed above explicitly relate to horizontal mergers and may thus not be straightforwardly applicable to non-horizontal mergers, we explicitly distinguish between

[4] Both strands emphasise the importance of market access considerations in explaining cross-border M&A. The IO literature enriches our understanding of cross-border M&A by building market power considerations into the model. Market power is generally considered to be the main motivation for mergers, at least in a domestic context and mergers are well-known to account for the lion's share of FDI. Also, cross-border mergers could of course be driven by efficiency gains through technological progress, scale economies, rationalisation gains etc. However, taking account of these is beyond the scope of this paper.

[5] There is a small number of recent related studies investigating the determinants of international cross-border M&As. For example, Di Giovanni (2005) uses M&A data at the country level. Bertrand et al. (2004) use industry level data but do not distinguish vertical and horizontal mergers. Also related to our work are empirical papers on the determinants of cross-border equity flows (portfolio investment), see, e.g., Portes *et al.* (2001) and Portes and Rey (2005).

[6] They estimate that the tax equivalent of international trade costs for a typical industrial country is 74%. These consist of transportation costs (21%), tariff and non-tariff policy barriers (8%) and other border-related non-policy barriers (33%).

horizontal mergers and non-horizontal mergers. Horizontal M&As are defined as mergers between firms within the same industry, whereas non-horizontal M&As are defined as mergers between firms in different industries. To the best of our knowledge, the present paper is the first to explicitly distinguish these two types of cross-border mergers. We conjecture that tariff-jumping considerations are more important for horizontal than for non-horizontal measures. It, thus, relates to and extends the empirical literature that attempts to distinguish indirectly horizontal from vertical FDI based on the knowledge-capital model (Carr et al., 2001; Blonigen, 2003), although we are cautious to point out that our measure of non-horizontal mergers includes both vertical and conglomerate mergers.

We further attempt to account for the anti-competitive effect of trade barriers that are emphasised in the international IO literature by including a multilateral index of trade costs with respect to third countries (weighted by respective market size).[7] The effect of multilateral trade costs on cross-border M&A may thus not only represent pre-emptive domestic mergers but also the incentives for competing firms to bid for a potential target on the basis of tariff-jumping considerations. Thus, in a world with more than two countries the multilateral trade cost index is positively related to *both* domestic and cross-border pre-emptive mergers. In order to avoid having to model market structure in a multi-country setting we emphasise the latter channel in our theoretical model.

Distinguishing empirically between horizontal and non-horizontal M&As brings to the fore a number of differences in the determinants between the two types of mergers. While in the aggregate trade costs affect cross-border merger activity negatively, its impact is

[7] In fact, this measure is similar to the remoteness measure commonly employed in the economic geography literature (Helliwell, 1998). In a trade context remoteness is used to capture the set of alternative locations from which a country may import. The availability of nearby alternatives is important as it reduces its

significantly less pronounced for horizontal mergers than for non-horizontal mergers. This suggests that treating heterogeneous mergers as a homogenous group at the country level fails to uncover useful information and may potentially produce biased results.

The remainder of the paper is structured as follows. Section 2 describes the database on M&As and presents some descriptive statistics. In section 3 we develop a simple theoretical model of cross-border M&A as a motivation for our empirical analysis. Section 4 introduces the empirical model, describes the variables and discusses the econometric methodology. Section 5 presents and analyses the estimation results of the basic model. Section 6 sums ups the conclusions.

2. Definitions and Patterns

Data on mergers and acquisitions originate from the Global Mergers and Acquisitions database included in Thomson Financial Securities. It is claimed that this dataset includes all domestic and cross-border mergers and acquisitions worldwide in excess of one million dollar. This dataset has been used relatively little in previous research, although a number of studies have used these data to analyse the nature of primarily domestic mergers (for example, Gugler et al. 2003). Manchin (2004) and Di Giovanni (2005) appear to be the only studies to have used these data to explicitly analyse patterns in aggregate cross-border mergers and acquisitions.[8]

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dependence on a particular closely located exporting country. The logic in the context of cross-border mergers is very similar.

[8] Given the close link between the present paper, which focuses on cross-border M&A, and the FDI literature, which resolves to an important extent around the role of trade, it is worthwhile making clear the relationship between cross-border M&A and FDI. Cross-border M&A is typically considered to be a subset of FDI ranging from about 50% to 90% depending on the source that is consulted. The remainder of FDI is generally considered to be realised through greenfield investment. Thus, a majority of FDI tends to occur through cross-border M&A. While thinking of cross-border M&A as simply a component of FDI may be useful, the UNCTAD's *World Invest Report* for 2000, emphasises that the link between cross-border M&A and FDI is

For the present analysis we use a fairly restrictive definition of M&A which excludes portfolio investment. More particularly, the data define an M&A as a transaction where the acquirer obtains a majority interest in the target by either

- acquiring an interest of 50% or over in the target
- raising its interest from below to above 50%, or
- acquiring the remaining interest it does not already own.[9]

Moreover, we concentrate on announced rather than actual M&A. This allows us to analyse the desire to merge, which is not necessarily the same as actual mergers due to, for example, the impact of merger policy. A large merger may be desired and announced by the acquirer (and target), but the competition authority may not allow this transaction to go ahead. This instance would, however, still be recorded in the data. The vast majority of announced mergers are consummated, however.

The database allows us to determine the main industry of the acquirer as well as of the target company. Hence, we can determine whether two firms within the same industry merge, or whether the merger takes place across industries. The former case is a standard horizontal merger whereas the latter combines both vertical and conglomerate mergers. More specifically, horizontal M&A is defined as the activity of M&A that takes place

much more complicated in reality. FDI, in contrast to cross-border M&A, solely refers to transactions between parents and affiliates. Cross-border M&A includes also investments that are financed via domestic and international capital markets. It is not always possible to trace the country from which these funds originate. Moreover, FDI refers to net investments whereas M&A refer to gross transactions (acquisitions and divestments). Due to those differences, it is therefore well possible that cross-border M&A exceeds the documented value of FDI.

[9] The analysis excludes minority stake acquisitions, repurchase programs, self-tender offers, recapitalisation, and exchange offers.

within the same 4-digit US SIC industry. It is thereby assumed that 4-digit industries represent homogenous groupings of firms.[10] The main motivation to engage in horizontal cross-border M&A is market access. Non-horizontal mergers are those that take place across 4-digit industries.[11] The main question is to see whether horizontal and non-horizontal mergers behave differently in the presence of trade costs.

Table 1 summarises the number of deals and the average value of deals for different types of mergers over the 1990s. We distinguish between horizontal and non-horizontal transactions as well as between domestic and cross-border deals. When comparing cross-border M&A with domestic mergers a number of points can be made. First, the average value of cross-border transactions is substantially higher than that of domestic merger transactions. This may reflect the higher fixed cost associated with investment abroad.

Second, both in terms of the number of deals as well as their average value the relative importance of cross-border mergers in global merger activity is on the increase. The number of cross-border deals increased by 146% from 1990/1991 to 2000/2001, while the number of domestic deals increased by 116% over the same period. Also in terms of the value per merger the importance of cross-border merger activity has increased relative to domestic M&A. In particular, the average value of cross-border deals has increased by 18%

[10] Classifying horizontal and non-horizontal mergers on the basis of their 4-digit SIC code may in some cases be too restrictive. Specifically, some transactions across 4 digit industries may still involve horizontal mergers, in particular when multi-product firms are prevalent. This could only be addressed adequately if data were available on all products produced by a firm, which is not the case with the data available to us. Alternatively, one may classify mergers at higher levels of aggregation. However, this is likely to contaminate the group of horizontal mergers with non-horizontal mergers. As our main focus is on horizontal mergers we prefer a conservative definition of horizontal M&A.

[11] Vertical mergers take place across 4-digit industries between firms that are related through buyer-supplier links. Conglomerate mergers also take place across 4-digit industries, but are not associated with input-output linkages. In order to distinguish these two types of mergers directly one would need detailed input-output tables for a large number of countries. Using the Input-Output table for 1992 for the US (assuming that these relationships are representative for the OECD as a whole) in combination with bilateral trade data suggests that the actual number of vertical cross-border M&A is very small. This is also confirmed by Gugler *et al.* (2003) who suggest that most mergers across 4-digit industries are unrelated to input-output linkages.

relative to 12% for domestic deals.[12] If we believe that markets have become more integrated, i.e., trade costs have fallen, then the fact that cross-border mergers have become more important goes at first sight against the tariff-jumping argument and is more in line with Horn and Persson's (2001) conclusion that domestic pre-emptive mergers have become less important.

Third, similar to Gugler et al. (2003) we find that horizontal M&A account for about 42% of total global M&A. However, the share of horizontal mergers in cross-border M&A is substantially smaller (at 32%) than that of horizontal mergers in domestic M&A (45%). One possible explanation is that non-horizontal mergers may be more frequent in an international context as the incentives for them are likely to be stronger. The potential gains from international diversification are expected to be larger as there are both product and geographical diversification, thus encouraging conglomerate mergers. More related to the theory on foreign direct investment, persistent differences in factor prices provide profitable opportunities for the establishment of international production networks through vertical mergers (see Markusen, 2002).

[Table 1 here]

Table 2 reports the number of cross-border mergers, the main interest of this paper, by broad industrial category. Manufacturing is the largest acquiring industry, followed by the financial sector. The former is, also, the most important target industry for mergers, accounting for approximately 40% of cross-border acquirers and targets. The dominance of manufacturing in cross-border M&A may be explained by the strong pressure in developed economies to restructure its manufacturing activities due to increased foreign competition

[12] These trends are in line with OECD (2001) and Di Giovanni (2005). While the latter reports larger total numbers, the average values are similar to ours. This may be explained by the more restrictive definition of M&A employed in the present paper. Note that UNCTAD (2000) does not report an increase in the

or technological progress. This dominance provides a justification for concentrating on manufacturing in the empirical part of this paper. Another reason to restrict our focus to manufacturing is that its outputs tend to be tradable, whereas this may be less so for other sectors. Hence, we would expect the role of trade costs to be most visible in manufacturing.

[Table 2 here]

Table 3 reports the number of cross-border merger deals by region of origin of acquiring and target firms. The dataset distinguishes the following regions: Africa/Middle East (AE), North America (AM), Asia-Pacific (AP), Europe (EU), Japan and South-East Asia (JP), and supranational (SN).[13] From the data it follows that, by and large, the majority of M&A activity occurs within the same geographic region. This is in line with the frequent finding that international investment, whether FDI, portfolio or M&A, decreases with distance (e.g, Carr et al., 2001, Portes and Rey, 2005; Di Giovanni, 2005). We also find, however, that a substantial amount of European firms acquire US firms and vice versa. Finally, it is apparent that most cross-border M&A take place between developed countries. Roughly, 70% of all cross-border deals involve only Europe and North-America.

[Table 3 here]

3. A Simple Model of Cross-Border M&A

This section provides a highly stylised model of cross-border M&A. The purpose of this section is to provide a motivation for our empirical analysis below, rather than to develop a comprehensive model that incorporates all important dimensions to international mergers.[14]

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importance of cross-border M&A in total M&A either in terms of numbers or values. This difference results from the different starting point used in the World Investment Report (1987 rather than 1990).

[13] Transactions involving supranational firms are not recorded in the same way as other transactions as such firms have no formal base country.

[14] In particular in order to keep our model simple we do not consider a full strategic framework here, that is, we do not explicitly model the valuation of a takeover target, which represents a strong departure from the theoretical M&A literature (Horn and Persson, 2001) in which the price of the bid is endogenously determined in a bargaining game. Also, we do not explicitly consider efficiency gains as a motive for mergers.

Our approach is based on the dartboard model recently proposed by Head and Ries (2005) which they use to explain the pattern of Japanese FDI. We extend their model by distinguishing between different types of cross-border M&A, namely horizontal and non-horizontal mergers.

The probability of a cross-border acquisition of a given unit in industry *j* and country *l* by a bidder in industry *i* and country *k* is denoted by *P*. The expected number of bilateral cross-border M&A, *m*, is then given by:

$$m_{ijkl} = P_{ijkl} n_{jl} \tag{1}$$

where *n* refers to the total number of potential target firms in industry *j* and country *l*. We assume that the valuation of potential targets is independently and identically distributed across bidders. Everything else equal, all bidders have an identical probability of winning a bid. In a frictionless world, the probability of a firm in industry *j* in country *l* being acquired by a firm in industry *i* in country *k* is given by the number of potential acquiring firms in industry *i* and country *k* over the total number of potential acquirers in the world.

$$P_{ijkl} = \frac{n_{ik}}{\sum_{i=1}^{I} \sum_{k \neq l}^{K} n_{ik}} \tag{2}$$

We thus exclude the possibility of pre-emptive domestic mergers as such mergers are typically motivated by market power considerations. In order to keep the model as simple as possible we abstract from market structure considerations altogether.[15]

In order to take account of transaction costs consider a firm *g*'s private valuation, *v**, of a potential target, *h*,

$$v_{gh}^{*} = X_{gh}\beta + \varepsilon_{gh} \tag{3}$$

which is a function of observed, *X*, and unobserved characteristics, ε. The last term is a random term with Type I Extreme Value distribution with cumulative distribution function: $CDF(\varepsilon) = \exp[-\exp(-\varepsilon)]$. The error term refers to the base valuation in a frictionless world (Head and Ries, 2005).

In a world where frictions are important the valuation of the firm will be dependent on trade costs. The role of transport costs on a firm's private valuation depends on the objective a potential take-over is supposed to fulfil, i.e., whether it is a horizontal or a non-horizontal cross-border merger. A horizontal merger is typically assumed to be driven by market access considerations. Such mergers may thus be considered as alternatives to exporting in supplying a foreign market. Transport costs may be expected to affect the relative attractiveness of these alternative modes of entry and thereby affect the desire to engage in M&A.[16] The tariff-jumping argument entails that the incentive for a profit-maximising firm

[15] We justify this important simplification in our model by pointing out that pre-emptive tariff-jumping mergers and pre-emptive domestic mergers respond in an observationally similar way to trade costs. While in our theoretical model we only allow for pre-emptive cross-border mergers we cannot differentiate between these two channels in our empirical analysis.

[16] We solely concentrate on the relationship between trade and M&A, and assume that M&A and greenfield investment are independent. The latter assumption is admittedly quite restrictive, but allowing for this

to engage in a horizontal merger increases in the level of transport costs (Brainard, 1997; Markusen, 2002).[17] No such incentive exists for non-horizontal mergers.

For other types of mergers trade costs are likely have a negative effect on a firm's private valuation absent any tariff-jumping motivations. Head and Ries (2007) suggest that conglomerate mergers may be characterised by an ability-proximity trade-off. On the one hand, conglomerate mergers may yield important efficiency gains when the acquiring firm has an advantage in managing the target's firm resources. On the other, trade costs in the form of informational barriers (related to cultural and physical distance) may provide a disadvantage for remote managers. A similar argument may apply to horizontal mergers and vertical mergers by reducing efficiency gains of producing certain activities in low costs locations. However, because of tariff-jumping considerations the role of trade costs is ambiguous for horizontal mergers, but strictly negative for non-horizontal mergers.

Thus, we assume that a firm's private valuation depends on trade costs, either in the form of information or transport costs. A firm will adjust its private valuation by:

$$-\alpha_1 \ln \tau_{kl} + \alpha_2 D_{ij} \ln \tau_{kl} \quad \text{where} \quad \begin{cases} D = 1 \text{ if } i = j \\ D = 0 \text{ if } i \neq j \end{cases} \qquad (4)$$

where α_1 refers to the impact of trade costs for non-horizontal mergers. The second term interacts an indicator variable which equals one when an intended merger is horizontal

interdependence is beyond the scope of this paper. Theoretical contributions emphasising the interdependence of those two modes of entry are provided by Ferrett (2003), Norback and Persson (2004), and Nocke and Yeaple (2004).

[17] To the extent that mergers across different industries are driven by vertical linkages they facilitate the development of international production networks and are likely to complement trade in a way similar to (vertical) greenfield investment (Markusen, 2002). Trade costs reduce the cost-saving potential of vertical mergers provided by international factor price differences. However, as stated in the previous section, the actual number of cross-industry mergers driven by input-output linkages is likely to be very small in practice.

($i = j$), and zero otherwise ($i \neq j$) with trade costs. The second term gives the differential impact of trade costs across horizontal and non-horizontal mergers. *A priori*, we would expect this to be positive under the "tariff-jumping" argument. The total impact of transaction costs on a bid leading to horizontal M&A is given by $-\alpha_1+\alpha_2$.

Using discrete choice theory, it can be demonstrated that the probability that a potential acquiring firm *g* is prepared to pay the highest bid (expects the highest profits) for a potential acquiring firm *h* amongst competing potential acquirers is given by the following logit expression:

$$\frac{\exp[-(\alpha_1 - \alpha_2 D_{ij}) \ln \tau_{kl}]}{\sum_{i=1}^{I} \sum_{k \neq l}^{K} \exp[-(\alpha_1 - \alpha_2 D_{ij}) \ln \tau_{kl}]} \tag{5}$$

The probability of a certain horizontal cross-border merger thus depends positively on trade costs, but negatively on the trade costs between the potential target and competing acquirers. The probability that any firm in industry *i* and country *k* will acquire any potential target in industry *j* and country *l* can then be derived by rewriting (5) and multiplying it by (2) to obtain:

$$P_{ijkl} = \frac{n_{ik} / \tau_{kl}^{(\alpha_1 - \alpha_2 D)}}{\sum_{i=1}^{I} \sum_{k \neq l}^{K} n_{ik} / \tau_{kl}^{(\alpha_1 - \alpha_2 D)}} \tag{6}$$

The majority of cross-industry mergers are likely to be conglomerate deals, which cannot be assumed to be related to trade costs in any systematic way.

For a cross-border merger to actually occur the highest bid needs to be profitable, which is satisfied when the level of expected additional profits exceeds $-(\alpha_1 - \alpha_2 D_{ij}) \ln \tau_{kl} + \varepsilon$.

The expected number of bilateral cross-border M&A, m_{ijkl}, is then given by substituting (6) into equation (1):

$$m_{ijkl} = \frac{\rho_l n_{ik} n_{jl}}{\tau_{kl}^{(\alpha_1 - \alpha_2 D)}} \tag{7}$$

where $\rho_l = 1/(\sum_{i=1}^{I} \sum_{k \neq l}^{K} n_{ik} / \tau_{kl}^{(\alpha_1 - \alpha_2 D)})$ a multilateral index of trade costs. This is essentially an index of proximity of bidding teams for a given unit in industry *j* and country *l*. Head and Ries (2005) label this term therefore the bid potential.[18]

Thus, trade costs affect cross-border mergers in two ways. A direct effect captured by τ encourages tariff-jumping in the form of horizontal cross-border mergers and an indirect effect ρ which encourages horizontal cross-border mergers by competing acquiring firms. These findings, combined with the conjecture that these effects differ between horizontal and non-horizontal mergers, are the starting points for our empirical analysis described in the next sections.

4. Empirical Methodology

[18] It also corresponds to the remoteness measure sometimes used in the trade and geography literature when we assume that $\alpha_1 - \alpha_2 D = 1$ (Helliwell, 1998). In a trade context, remoteness captures the set of alternative locations from which a country may import. The availability of nearby alternatives is important as it reduces its dependence on a particular closely located exporting country. For instance, the amount of trade between Australia and New Zealand is likely to be much larger than that between the US and Canada, or two countries in continental Europe with similar sizes and distance.

We now proceed with the empirical model, data issues and the econometric methodology. In order to carry out our empirical analysis we assume that the number of bidders in each industry is proportional to the size of its industry and log-linearise equation (7). Moreover, as we aggregate the data from the 4-digit US SIC classification to the 2-digit SIC classifications to keep computations manageable, we replace D_{ij} by the share of horizontal merger in total cross-border mergers, σ_{ij}.[19] We thus obtain the following estimable model of the expected number of cross-border mergers (m) by acquirers in industry i in country k with target in industry j in country l at time t:[20]

$$\begin{aligned} m_{ijklt} &= \alpha_0 + \alpha_1 \ln Y_{ikt} + \alpha_2 \ln Y_{jlt} - \alpha_3 \ln \tau_{klt} + \alpha_4 \sigma_{ijkl} \ln \tau_{klt} + \alpha_5 \ln \rho_l \\ &+ \alpha_6 \sigma_{ijkl} \ln \rho_l + \alpha_7 \ln S_{kt} + \alpha_8 \ln S_{lt} + \alpha_9 FTA_{klt} + \varepsilon_{ik} + \varepsilon_{jl} + \varepsilon_t + \varepsilon_{ijklt} \end{aligned} \quad (8)$$

where Y is the economic size of the industry in each country, ρ is the multilateral trade cost index of target country l, τ is a proxy for trade costs and $\sigma \ln \tau$, $\sigma \ln \rho$ are the interaction terms between the share of horizontal mergers over total mergers and bilateral trade costs and the multilateral trade cost index respectively. While the second interaction does not strictly come out of the theoretical model, the discussion suggests that the impact of multilateral trade costs is likely to differ across horizontal and non-horizontal mergers.

The empirical model is further augmented with a number of variables that have been found to be important in similar settings. As mergers, and particularly conglomerate mergers, are expected to be affected by financial markets we, similar to DiGiovanni (2005) include a

[19] As mergers are classified at the 4-digit level but the analysis is carried out at the 2-digit level the share varies between zero and unity for observations within the same 2-digit industry and always equals zero for observations across different industries.

[20] This effectively represents a standard gravity model applied to cross-border M&A. Gravity models have had a long history in the empirical analysis of trade flows and, more recently, have also become popular in the

financial control variable measuring the total value of stocks traded as a percentage of GDP both for the target and the acquirer (S_{tk} and S_{tl}). We also include a set of dummies capturing the effects of different regional trade agreements on the number of mergers and acquisitions, as these have been found to be important in the literature (e.g., DiGiovanni, 2005). Four different bilateral dummies are included namely for EU countries, for Europe Agreements signed between EU countries and Eastern European applicant countries (EUFTA), for EFTA members, and for NAFTA members.

Furthermore, we include acquisition-industry and target-industry dummies to control for time-invariant fixed effects. These may go some way to control for market structure and for differences in the institutional environments including taxation and merger policies. In addition, we include a full set of time dummies to control for global macro-economic influences and asset market bubbles. The last term ε_{ijklt} captures any remaining white noise.

The dependent variable in equation (8) is the number of cross-border mergers and acquisitions. We take account of the fact that this variable is discrete and therefore we carry out the regressions using negative binomial estimators. As a robustness check we re-run the same set of equations where the dependent variable is the value of cross-border mergers and acquisitions using Tobit estimations.

We use three measures of trade costs: i) distance data, which are obtained from CEPII; ii) the level of applied protection; and iii) tariff data. The former two are time-invariant, whereas the latter is time-varying.

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analysis of foreign direct investment flows (e.g., Carr et al., 2001), equity capital flows (Portes et al., 2001,

In a trade context distance has been interpreted as a measure of trade costs. Data on the level of applied protection are obtained from a new dataset called Market Access Map (MAcMap), developed jointly by ITC (UNCTAD-WTO, Geneva) and CEPII (Paris). It provides detailed information on highly disaggregated bilateral applied tariff duties. The tariff data represent equivalent *ad valorem* tariffs taking into account *ad valorem* and non *ad valorem* tariffs, quotas, antidumping measures and preferential trade agreements. For a detailed description of this dataset see Bouët et al. (2004). As these data are only available for the year 2000 we assume that the level of protection is constant throughout the sample period under the specification using MacMap data. The MacMap database provides a unique resource that is well equipped to the analysis of applied protection at the disaggregated level. Although the MAcMap database provides a comprehensive treatment of preferential trade agreements by proposing *ad valorem* equivalent calculations it has some shortcomings as it does not vary over time. To be able to better explain changes in M&As pattern over time due to changes in trade costs over time we also use tariff data that come from the TRAINS database provided by UNCTAD.

We estimate the model using data for 23 OECD countries and 19 manufacturing industries for the period 1990-2001. In order to enhance the manageability of the dataset we use 2-year averages except for the last year. This gives us 23 source countries * 22 target countries * 19 source industries * 19 target industries * 6 periods = 1,095,996 observations. The actual number of observations in the dataset is somewhat smaller due to the presence of missing values in the OECD STAN data, which is used to obtain data on industry level output.

Portes and Rey, 2005) and M&A activity (e.g., Di Giovanni, 2005).

5. Results

Table 4 presents the results obtained from estimating equation (8). The first set of regressions presents random-effects negative binomial estimates (described by, e.g., Cameron and Trivedi, 1998) where the panel variable is the target-industry. In the second set we also include dummies for acquisition industries. Each set reports the results for our three measures of trade costs: distance, the level of applied protection (from MAcMap), and tariffs (from TRAINS).

We find that the number of mergers increases in both the market size of the acquisition and the target country. Also, mergers are positively affected by the size of financial markets in both countries.

The statistically significant coefficients on the interaction terms of bilateral and multilateral trade costs indicate that the role of trade costs differs across horizontal and non-horizontal mergers. Broadly speaking, the impact of bilateral trade costs (τ) is less negative or even positive the higher the share of horizontal mergers is in total mergers. This is in line with the idea that tariff-jumping motivations do play some role in explaining horizontal mergers.

Multilateral trade costs (ρ), on the contrary, tend to reduce the number of cross-border mergers the higher the share of horizontal mergers. Thus, the more isolated a country is due to either its geographical location or policy barriers the more likely is it that a potential target is acquired by pre-emptive mergers, be they cross-border as in our analysis or domestic as in Horn and Persson (2001).

These results thus suggest that, in contrast to the suggestion raised in the literature, no opposing tendency exists between the market access and market power incentives to merge across borders. These results appear to be consistent across the three different measures of trade costs. Quantitatively, however, there are some important differences across specifications.

The average effect of bilateral trade costs on cross-border M&A is given by the coefficient on τ plus the coefficient on the interaction term ($\tau^*\sigma$) times the share of horizontal mergers in total mergers. As the quantitative effect of bilateral trade costs varies considerably across the three different measures of trade costs we will discuss them one by one (using the results presented in Table 4). Evaluating the coefficients at the mean value of horizontal mergers (equal to 0.32) shows that the average effect of distance ranges from -0.43 in the regressions without to -0.24 in the regressions with dummy variables. For the level of applied protection the average effect is between -7.12 and -5.33. Finally, the average effect of tariffs ranges from 0.002 and 0.008. Thus, on average the effect of bilateral trade costs on cross-border M&A is negative.[21]

Alternatively, one may calculate the critical value of σ at which the marginal effect of bilateral trade costs switches signs. For distance, we observe that the impact of trade costs on cross-border will be negative even if all mergers are of the horizontal type (0.45/0.07>1 and 0.47/0.07>1). Thus, the marginal effect of trade never changes sign. For the level of applied protection, is always negative in the regression that does not include acquisition-specific industry effects, but trade costs increase cross-border M&A when 92% or more is of the horizontal type in the regressions with acquisition-industry fixed effects. For tariffs,

[21] While a negative effect of trade costs on cross-border capital flows has been found in previous work (e.g., Carr et al., 2001; Portes and Rey, 2005; Di Giovanni, 2005), those studies are all at the country level.

the critical value is estimated to be in the range of 4% and 26%. The results thus do not suggest that firms necessarily tariff jump in the presence of high bilateral trade costs, but that the effect of bilateral trade costs becomes less negative for horizontal mergers. A similar exercise could of course also be conducted for the role of multilateral trade costs, but does not yield any new insights.

[Table 4 here]

In order to examine whether other explanatory variables also affect horizontal and non-horizontal M&A differently we relax the assumption of identical coefficients for both horizontal and non-horizontal M&A. Table 5 presents results where all explanatory variables are interacted with the share of horizontal mergers in total mergers. There results confirm our previous results presented in Table 4. In particular, coefficients on the alternative trade costs variables are similar to those presented in the earlier analysis.[22]

[Table 5 here]

As a further robustness check we re-run the regressions using the values of mergers and acquisitions instead of just the numbers. This allows us to investigate whether the size of the merger transaction, rather than just the pure number, also matters. Given the bounded nature of the dependent variable the model is estimated using a Tobit estimator.[23] The first four columns of Table 6 presents pooled estimation results which do not include industry dummies. The results are generally similar to those obtained by using the number of mergers and acquisitions in terms of sign and statistical significance. The only difference is that the coefficient on the multilateral trade cost index (ρ) is now only statistically significant when measuring trade costs using the level of applied protection. Inclusion of

[22] We also investigated whether there is a non-linear relationship between trade costs and M&As by including squared values of τ and ρ and the respective interaction terms. Estimating similar equations as in Table 3 produces, however, unsatisfactory results. There is no clear pattern and coefficients are not robust to the measurement of trade costs. Hence, we prefer the results with linear effects as reported in the paper. The additional regressions are not reported here to save space.

target-industry and acquirer-industry dummies in the latter four columns does not lead to any further changes in results.[24]

[Table 6 here]

6. Conclusions

This paper analyses in detail the role of trade costs on bilateral cross-border M&As for 23 OECD countries over 1990-2001 using industry level data on merger activity and a new data source on with detailed information on the bilateral level of applied protection. In the aggregate, trade barriers have negative effects on cross-border M&A. An important finding of our paper is that the effect of trade costs differs depending on whether mergers are horizontal (i.e., with acquirer and target in the same industry) or whether they span different industries.

This suggests that results based on aggregate data which do not distinguish these types neglect an important source of heterogeneity. It also indicates that the less negative effect on horizontal mergers provides support for the tariff-jumping argument put forward in the literature on the determinants of horizontal FDI. Hence, the trade regime might have important implications for attracting inward investment in terms of M&As, an issue that should be recognised by governments.

[23] In order to deal with the fact that the log of zero is not defined we use *ln(v+1)* as the dependent variable in the Tobit estimations where *v* is the value of cross-border mergers. Using this dependent variable also brings our analysis more in line with Giovanni (2005) who uses the values of mergers as dependent variable.
[24] As a final robustness check we also interacted all variables in the Tobit model with σ, similar to the estimation in Table 5. Results, which are not reported here to save space, indicate that our conclusions are robust to this alteration.

References

Anderson, J. and E. Van Wincoop (2004), "Trade Costs", *Journal of Economic Literature,* Vol. 42, pp. 691 - 751.

Andrade, G., M. Mitchell and E. Stafford (2001), "New Evidence and Perspectives on Mergers", *Journal of Economic Perspectives*, Vol. 15, No. 2., pp. 103-120

Ben-Ishai, G. (2004), "Why entry induces mergers: The case of trade liberalization and opportunity costs", mimeo, Hebrew University Jerusalem

Bertrand, O., J. Mucchielli and H. Zitouna (2004), "Location Choices of Multinational Firms: The Case of Mergers and Acquisitions", HWWA Discussion Paper 274.

Bertrand, O. and H. Zitouna (2006), "Trade liberalization and industrial restructuring: the role of cross-border mergers and acquisitions", *Journal of Economics and Management*, 15, 479-515.

Bjorvatn, K. (2004). "Economic integration and the profitability of cross-border mergers and acquisitions", *European Economic Review*, 48, pp. 1211-1226.

Bouët, A., Y. Decreux, L. Fontagé, S. Jean and D. Laborde (2004), "A Consitent, ad valeorem equivalent measure of applied protection across the world: The MAcMap-HS6 database", *CEPII Working Paper*, No. 22.

Brainard, S. L. (1997), "An Empirical Assessment of the Proximity-Concentration Trade-Off Between Multinational Sales and Trade", *American Economic Review*, 87, pp. 520-545

Breinlich, H. (2006), "Trade liberalization and industrial restructuring through mergers and acquisitions", CEP Discussion Paper 717, London School of Economics

Cameron, A.C. and P.K. Trivedi (1998), *Regression Analysis of Count Data*, Cambridge: Cambridge University Press.

Carr, D.L., J.R. Markusen and K.E. Maskus (2001), Estimating the knowledge-capital model of the multinational enterprise, *American Economic Review*, 91, pp. 693-708.

Di Giovanni, J. (2005), "What drives capital flows? The case of cross-border M&A activity and financial deepening", *Journal of International Economics*, 65, pp. 127-149.

Ferrett, B. (2003), "Greenfield Investment versus Acquisition: Positive Analysis", GEP Research Paper 03/02, University of Nottingham

Gugler, K., D. C. Mueller, B. B. Yurtoglu and C. Zulehner (2003), "The Effects of Mergers: An International Comparison", *International Journal of Industrial Organization*, 21, pp. 625-653.

Head, K. and J. Ries (2005), "Judging Japan's FDI: The Verdict from a Dartboard Model," *Journal of the Japanese and International Economies*, 19, 215-232.

Head, K. and J. Ries (2007), "FDI as an Outcome of the Market for Corporate Control: Theory and Evidence", *Journal of International Economics*, forthcoming.

Helliwell, J.F. (1998), *How Much Do National Borders Matter?,* Washington D.C.: Brookings Institution.

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

Manchin, M. (2004), "Determinants of European cross-border mergers and acquisitions", European Commission, *European Economy Economic Papers*, No. 212.

Markusen, J.R., (2002), *Multinational firms and the theory of international trade*, MIT Press

Martin, P. and H. Rey (2004), "Financial super-markets: Size matters for asset trade", *Journal of International Economics*, 64, 335-361.

Motta, M. (1992). "Multinational Firms and the Tariff-Jumping Argument: A Game Theoretic Analysis with Some Unconventional Conclusions", *European Economic Review*, Vol. 36, pp. 1557 – 1571.

Neary, P. (2007), "Cross-border mergers as instruments of comparative advantage", *Review of Economic Studies*, forthcoming.

Nocke, V. and S. Yeaple (2004), "An assignment theory of foreign direct investment", NBER Working Paper 11003.

Norbäck, P.J. and L. Persson (2004), "Privatization and foreign competition", *Journal of International Economics*, Vol. 62, pp. 409-416.

OECD (2001), New Patterns of Industrial Globalisation, Cross-border Mergers and Acquisitions and Strategic Alliances.

Portes, R. and H. Rey (2005), "The determinants of cross-border equity flows", *Journal of International Economics*, Vol. 65, pp. 269-296.

Portes, R., H. Rey and Y. Oh (2001), "Information and capital flows: the determinants of transactions in financial assets", *European Economic Review*, 45, 783-796.

Tekin Koru, A. (2004), "Is FDI indeed tariff-jumping? Firm level evidence", mimeo, University of Oregon.

UNCTAD (2000), "Cross-border Mergers and Acquisitions and Development", *World Investment Report*, Geneva: United Nations.

Table 1: Summary statistics M&A, 1990-2001

	Domestic M&A			Cross-border M&A		
	Non-Hor	Horizontal	Total	Non-Hor	Horizontal	Total
			Number of deals			
1990/1991	55.36%	44.64%	6,281	70.15%	29.85%	2,161
1992/1993	58.01%	41.99%	7,575	69.24%	30.76%	2,123
1994/1995	53.58%	46.42%	10,245	68.16%	31.84%	2,921
1996/1997	53.73%	46.27%	13,760	66.82%	33.18%	3,668
1998/1999	53.19%	46.81%	17,586	67.91%	32.09%	5,042
2000/2001	59.46%	40.54%	13,557	68.75%	31.25%	5,319
Total	55.31%	44.69%	69,004	68.33%	31.67%	21,234
			Average deal value (mln $)			
1990/1991	50.95	41.04	46.53	61.37	54.49	59.32
1992/1993	40.45	38.82	39.76	48.71	44.05	47.27
1994/1995	38.71	44.19	41.25	45.92	49.09	46.93
1996/1997	49.35	55.10	52.01	59.35	63.83	60.83
1998/1999	51.45	52.55	51.96	64.67	70.70	66.60
2000/2001	48.66	57.62	52.29	69.80	71.33	70.28
Total	47.31	50.23	48.61	60.53	62.48	61.15

Table 2: Summary Statistics M&A by Acquirer and Target Industry, 1990-2001

Acquirer\Target	Agr. & Mining	Man.	Trans.	Wholes.	Finance	Other services	Health & Edu.	Total
Agriculture & Mining	1205	194	79	61	53	46	34	1672
Manufacturing	269	6597	180	636	162	412	178	8434
Transportation & Public Util.	64	150	1246	50	43	176	31	1760
Wholesale	48	346	49	831	42	107	20	1443
Finance, Ins. & Estate	233	859	309	248	2260	499	108	4516
Other services	46	232	107	146	108	1931	136	2706
Health & Education	47	142	27	36	27	87	277	643
Total	1909	8514	2005	2009	2695	3258	784	21174

Government sector excluded.

Table 3: Summary Statistics Cross-Border M&A by Region, 1990-2001

Acquirer\Target	AE	AM	AP	EU	JP	SN	**Total**
AE	**170**	131	71	144			516
AM	209	**4,054**	814	2,337	68	2	7,484
AP	65	377	**2,083**	325	29		2,879
EU	237	2,398	729	**6,363**	44	2	9,773
JP	3	243	165	135	**21**		567
SN	1	1	8	5			15
Total	685	7,204	3,870	9,309	162	4	**21,234**

Table 4: The number of cross-border mergers
Negative binomial regression results

	distance	protection	tariffs	distance	protection	tariffs
Y_k	0.393	0.387	0.355	0.303	0.321	0.287
	(0.017)	(0.017)	(0.023)	(0.021)	(0.021)	(0.030)
	***	***	***	***	***	***
Y_l	0.404	0.432	0.301	0.403	0.425	0.31
	(0.020)	(0.020)	(0.028)	(0.020)	(0.020)	(0.028)
	***	***	***	***	***	***
S_k	0.893	0.848	0.65	0.882	0.859	0.651
	(0.034)	(0.035)	(0.045)	(0.035)	(0.035)	(0.045)***
	***	***	***	***	***	
S_l	0.495	0.457	0.139	0.505	0.462	0.141
	(0.030)	(0.030)	(0.038)	(0.031)	(0.030)	(0.038)
	***	***	***	***	***	***
ρ	0.148	0.09	0.084	0.124	0.077	0.055
	(0.039)	(0.013)	(0.033)	(0.039)	(0.013)	(0.033)
	***	***	**	***	***	*
τ	-0.453	-10.284	-0.008	-0.466	-8.153	-0.001
	(0.031)	(1.027)	(0.004)	(0.031)	(1.067)	(0.004)
	***	***	**	***	***	
$\rho * \sigma$	-0.424	-0.178	-0.319	-0.408	-0.173	-0.31
	(0.023)	(0.002)	(0.004)	(0.023)	(0.002)	(0.005)
	***	***	***	***	***	***
$\tau * \sigma$	0.072	9.885	0.031	0.069	8.821	0.028
	(0.030)	(1.501)	(0.006)	(0.030)	(1.421)	(0.006)
	**	***	***	**	***	***
Constant	-19.248	-21.888	-18.312	-19.226	-20.944	-19.154
	(0.739)	(0.629)	(0.910)	(0.814)	(0.694)	(1.068)
	***	***	***	***	***	***
Free Trade Area dummies	yes	yes	yes	yes	yes	yes
Target-industry effects	yes	yes	yes	yes	yes	yes
Acquirer-industry effects	no	no	no	yes	yes	yes
Observations	691762	642964	554725	691762	642964	554725
Number of tsicp_2	19	19	19	19	19	19
Number of observation	691762	642964	554725	691762	642964	554725
Log Likelihood	-10802.9	-10638.2	-6096.22	-10576.5	-10478.8	-6004.99
Chi-Square	16973.1	16485.99	10881.37	16221.29	15795.52	10427.67
Likelihood-ratio test vs. pooled	518.02	475.42	185.04	379.11	355.63	110.21

A full set of time dummies is included; the panel variable is the target-industry. Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, for industry *i* in acquisition country *k*, and industry *j* in target country *l*.

Table 5: The number of cross-border mergers
Negative binomial regression results with all variables interacted

	distance	protection	tariffs	distance	protection	tariffs
Y_k	0.481	0.423	0.362	0.368	0.355	0.262
	(0.018)	(0.018)	(0.025)	(0.023)	(0.022)	(0.033)
	***	***	***	***	***	***
Y_l	0.439	0.444	0.223	0.448	0.445	0.238
	(0.022)	(0.022)	(0.029)	(0.022)	(0.022)	(0.029)
	***	***	***	***	***	***
S_k	1.063	1.013	0.78	1.037	1.01	0.756
	(0.038)	(0.038)	(0.047)	(0.038)	(0.039)	(0.047)
	***	***	***	***	***	***
S_l	0.498	0.463	0.251	0.519	0.465	0.25
	(0.033)	(0.033)	(0.038)	(0.034)	(0.033)	(0.039)
	***	***	***	***	***	***
ρ	0.22	0.133	0.202	0.188	0.118	0.155
	(0.044)	(0.014)	(0.036)	(0.045)	(0.014)	(0.036)
	***	***	***	***	***	***
τ	-0.662	-16.705	-0.019	-0.671	-14.168	-0.01
	(0.031)	(1.295)	(0.004)	(0.031)	(1.373)	(0.005)
	***	***	***	***	***	*
$Y_k * \sigma$	-0.353	-0.173	-0.186	-0.255	-0.113	-0.128
	(0.038)	(0.037)	(0.048)	(0.038)	(0.037)	(0.049)
	***	***	***	***	***	***
$Y_l * \sigma$	-0.196	-0.115	-0.062	-0.221	-0.126	-0.077
	(0.033)	(0.032)	(0.045)	(0.034)	(0.033)	-0.047
	***	***		***	***	
$S_k * \sigma$	-0.592	-0.586	-0.423	-0.561	-0.574	-0.399
	(0.061)	(0.062)	(0.073)	(0.061)	(0.062)	(0.072)
	***	***	***	***	***	***
$S_l * \sigma$	0.024	0.001	-0.059	-0.003	-0.004	-0.073
	(0.054)	(0.053)	(0.060)	(0.055)	(0.053)	(0.060)
$\rho * \sigma$	-0.866	-0.446	-0.681	-0.777	-0.409	-0.626
	(0.069)	(0.028)	(0.048)	(0.069)	(0.028)	(0.048)
	***	***	***	***	***	***
$\tau * \sigma$	0.963	21.451	0.062	0.886	19.011	0.056
	(0.062)	(1.711)	(0.007)	(0.061)	(1.724)	(0.008)
	***	***	***	***	***	***
Constant	-19.5	-21.971	-15.234	-19.24	-21.181	-15.665
	(0.751)	(0.650)	(0.909)	(0.817)	(0.711)	(1.075)
	***	***	***	***	***	***
Free Trade Area dummies	yes	yes	yes	yes	yes	yes
Target-industry effects	yes	yes	yes	yes	yes	yes
Acquirer-industry effects	no	no	no	yes	yes	yes
Observations	691762	642964	554725	691762	642964	554725
Number of tsicp_2	19	19	19	19	19	19
Number of observation	691762	642964	554725	691762	642964	554725
Log Likelihood	-10544.7	-10437.8	-6257.55	-10348.5	-10310.6	-6165.48
Chi-Square	15265.37	15123.63	10604.97	14573.72	14569.54	10161.48
Likelihood-ratio test vs. pooled	520.5	511.83	211.5	362.55	380.84	132.24

A full set of time dummies is included; the panel variable is the target-industry. Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, for industry *i* in acquisition country *k*, and industry *j* in target country *l*.

Table 6: The value of cross-border mergers
Tobit regression results

	distance	distance[#]	protection	tariffs	distance	distance[#]	protection	tariffs
Y_k	2.657	2.657	2.680	2.423	1.982	1.982	2.172	1.767
	(0.094)	(0.262)	(0.097)	(0.126)	(0.109)	(0.386)	(0.106)	(0.139)
	***	***	***	***	***	***	***	***
Y_l	2.955	2.955	3.076	2.367	2.61	2.61	2.826	2.003
	(0.103)	(0.381)	(0.105)	(0.134)	(0.124)	(0.527)	(0.124)	(0.158)
	***	***	***	***	***	***	***	***
S_k	5.508	5.508	5.104	3.778	5.392	5.392	5.139	3.846
	(0.220)	(0.715)	(0.221)	(0.291)	(0.218)	(0.676)	(0.222)	(0.282)
	***	***	***	***	***	***	***	***
S_l	3.110	3.110	2.722	0.847	2.825	2.825	2.54	0.846
	(0.188)	(0.764)	(0.181)	(0.215)	(0.191)	(0.683)	(0.184)	(0.222)
	***	***	***	***	***	***	***	***
ρ	0.405	0.405	0.378	0.172	0.357	0.357	0.259	0.004
	(0.238)	(1.056)	(0.068)	(0.196)	(0.238)	(0.986)	(0.070)	(0.182)
	*		***				***	
τ	-3.044	-3.044	-60.244	-0.036	-3.262	-3.262	-38.754	0.012
	(0.173)	(0.524)	(8.676)	(0.015)	(0.176)	(0.514)	(7.913)	(0.009)
	***	***	***	**	***	***	***	
$\rho * \sigma$	-3.939	-3.939	-1.843	-2.982	-3.985	-3.985	-1.740	-2.815
	(0.179)	(0.382)	(0.025)	(0.051)	(0.193)	(0.404)	(0.025)	(0.051)
	***	***	***	***	***	***	***	***
$\tau * \sigma$	1.273	1.273	51.431	0.301	0.785	0.785	53.674	0.324
	(0.231)	(0.559)	(10.058)	(0.035)	(0.247)	(0.606)	(10.347)	(0.050)
	***	**	***	***	***		***	***
Constant	-148.019	-148.019	-164.098	-148.843	-141.613	-141.613	-155.413	-141.657
	(4.580)	(14.676)	(4.073)	(5.735)	(5.155)	(14.446)	(4.339)	(6.226)
	***	***	***	***	***	***	***	***
Free Trade Area dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target-industry effects	No	No	No	No	Yes	Yes	Yes	Yes
Acquirer-industry effects	No	No	No	No	Yes	Yes	Yes	Yes
Observations	691762	691762	642964	554725	691762	691762	642964	554725
Uncensored	2153	2153	2141	1187	2153	2153	2141	1187
Left-Censored	689609	689609	640823	553538	689609	689609	640823	553538
Log Likelihood	-15782	-15782	-15569.6	-9046.82	-15265.9	-15265.9	-15161.4	-8796.66
Chi-Square	6793.76	2648.71	6763.21	3697	6709.1	4238.3	6675.01	3680.72

A full set of time dummies is included, all variables are in logs. Robust standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, for industry i in acquisition country k, and industry j in target country l. # indicates that results are clustered by country pair.