What Is Motivating Liberalization Induced-Mergers? The Market Power Hypothesis Reexamined*

‘The mother of all trusts is the custom tariff law’, Charles Havemeyer, American Sugar Refining Company 1890.

Introduction
Trade liberalization often is viewed as triggering domestic mergers that are beneficial in nature. This perception often has been based upon two premises. The first is that trade liberalization restrains anticompetitive conduct and, hence, prevents the merging firms’ ability to exercise market power. The other premise is that liberalization facilitates entry of potentially more efficient firms and, hence, induces existing firms to form cost-reducing mergers. For these two reasons, mergers that appeared to be generated by liberalization of trade frequently have been subjected to lenient anti-merger scrutiny.

In two different cases, for example, competition agencies have conformed to this notion by approving mergers that created a considerable domestic monopoly. In both cases, approval was contingent upon exposure of relevant markets to effective foreign competition. One such merger was observed in 1993 in Australia, where the commission approved the creation of a domestic firm controlling essentially most of the domestic production of paper products. Another example took place in Israel, where the antitrust tribunal approved a merger between the only two local wood-chip manufacturers.1

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1 See State of Israel v. Etz Lavud. In this decision, the Israel Antitrust Tribunal explicitly ruled that if a market is effectively exposed to foreign trade, a merger should not raise any market power concerns and hence should be approved. Other antitrust agencies also have viewed this topic
However, this common notion that liberalization induces beneficial mergers may be inconsistent with previous merger studies. First, models of endogenous mergers suggest that liberalization should in fact *deter* and not encourage mergers. One of the central results of previous studies has been the recognition that entry of additional competitors reduces potential merger gains. Salant, Switzer and Reynolds (1983) illustrated this point by demonstrating that entry of additional competitors in a Cournot setting exacerbates an externality that arises from the merger’s benefit-sharing by non-participating firms. Davidson and Deneckere (1984) established that, even in price strategies where mergers induce a positive externality, entry reduces merger gains because it softens response curves of the merging firms. In the context of trade liberalization, these theoretical works suggest that if liberalization induces entry of foreign firms, it should in fact reduce the incidence of horizontal domestic mergers.

Second, previous theoretical studies do not support the presumption that liberalization-induced mergers are necessarily cost-reducing or welfare-enhancing. This presumes that entry of potentially more efficient firms would pressure local firms to reduce costs and, thereby, generate cost-reducing mergers. This, however, may be incorrect for two reasons. First, it fails to explain why profitable cost-reducing mergers were not completed prior to liberalization. Second, it fails to recognize that, in addition to introducing more efficient rivals, liberalization also reduces the residual demands faced by domestic firms. By reducing these residual demands, liberalization actually reduces the quantities that could be subjected to any cost synergies and, hence, the merger’s potential for cost savings overall. This recognition has led Long and Vousden, who study post-liberalization mergers in a Cournot setting, to suggest that liberalization-induced mergers similarly. Allan Fels, Chairman of the Australian Competition and Consumer Commission 1993, for example, stated: “Where local companies have faced significant import competition the commission has not opposed mergers.” Additionally, Debra Valentine, General Counsel U.S. Federal Trade Commission 1999, commented: “One of the reasons why the mergers we are seeing are not unduly problematic, is that trade liberalization, innovation and deregulation have caused markets to open and expand, entry barriers to fall and enabled more foreign firms to provide meaningful competition. That is, international trade has likely increased competition”
are not targeted at cost-reductions. For these two reasons, it appears that studies of endogenous mergers conflict rather than support the notion that liberalization-induced mergers are targeted at cost-reduction. Therefore, the prior theoretical work may be inconsistent with the lenient merger policy for two reasons: it suggests that liberalization deters merger incidence rather than induce it. It also indicates that liberalization reduces rather than increases the cost-savings of a merger.

Although prior theoretical literature persistently suggests that market power is one of the primary motives for horizontal mergers, its impact upon mergers in the context of trade liberalization has not been subjected to rigorous empirical studies. Some authors have pointed to the unprecedented level of merger activity that took place in U.S. industries at end of the 19th century, as anecdotal evidence that market power motivates horizontal mergers. This evidence suggests that a basic linkage between trade policy and merger incidence was observed following the legislation of the Mckinley Tariffs Act of 1890, one of the most protectionist measures adopted in the history of U.S trade policy. This legislation, which effectively foreclosed the U.S. domestic markets to foreign competitors, coincided with the formation of numerous horizontal trusts and consolidations. Globe and White (1988), who have documented merger activity over the past two centuries, observed that the greatest level of merger activity took place at the end of the 19th century, just a few years after the enactment of the tariffs. Some have commented that this is not coincidental, but rather that the unprecedented level of horizontal combinations was caused by the prohibitive tariff legislation. In this respect, it was argued that the introduction of tariffs fostered monopoly rents and thus encouraged the formation of horizontal trusts.

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2 The data used by Globe and White follow merger activity up to 1986 hence do not include the fifth merger wave that took place in the 1990s. Holmstrom and Kaplan (2001) indicated that merger activity as percent of GDP for the late 1990s exceeds the unprecedented 10% level of GDP observed by Globe and White. Nonetheless, the merger activity observed at the end of the 19th century was unprecedented in magnitude and remained so throughout the following century.

3 The notion that trade protectionism contributed to the rise of consolidations at the end of the 19th century does not contradict other explanations that have been offered for these consolidations. Among other explanations offered, some studies also have stressed the significance of technological changes and inability to enforce the Sherman Act until 1904. These explanations do not conflict
Estimating the significance of the market power hypothesis as a cause for horizontal mergers is the basic motivation for this paper. It summarizes the relevant research that was conducted on this topic in a PhD thesis submitted to the Hebrew University of Jerusalem. This paper weighs the importance of plausibly the most recognized motive for horizontal mergers in the literature. Particularly, the paper focuses upon two issues. First, it questions whether an exogenous reduction of potential market power reduces horizontal merger incidence. Second, it investigates how significant the market-power hypothesis is relative to other non-horizontal motives in the formation of mergers. For this purpose, industry-level data are collected in order to study the effect of trade liberalization on mergers and acquisitions. The study employs data for a trade liberalization program that was undertaken in Israel in 1992. It is important to recognize that this paper does not examine the impact of trade liberalization on international mergers. These have been subjected to a number of empirical investigations. This study considers the impact of trade liberalization on mergers between two domestic firms where the competitive aspects are contained within a single market. A basic Cournot model also is included to clarify and reexamine the relationship between a unilateral removal of trade barriers and merger incentives.

with the view that the Tariff Act also had an effect. Anecdotal evidence supporting the tariff’s effect is provided by Geisst (2000, p 51) who cites Charles Havemeyer, chairman of the American Sugar Refining Company testimony that “the mother of all trusts is the custom tariff law” in reference to the Mckinley tariffs of 1890. For an additional discussion of the link between the Mckinley tariffs and trusts, see Hazlett (1992).

The reader should be advised that additional proofs, a more general model, and additional estimations are provided in “Mergers in a small Economy,” PhD thesis, Hebrew University, 2005. This paper does not include a complete discussion of the research that was conducted, but rather provides a non-technical summary. For additional discussion please see the PhD thesis that will be available at the Hebrew University Library for Humanities and Social Sciences at Mount Scopus or provided upon request.

Evenett (2003) estimated the level of international and cross border mergers in the 1990s. It is worth noting that bilateral liberalization may induce cross-border mergers if production assets in the two markets are complementary, or if liberalization unified previously separable markets. However, this is not the case with a merger between two domestic firms.
In this way, the analysis in this paper addresses three central questions: 1) Has liberalization induced greater merger activity? 2) Why has it induced greater merger activity? And finally, 3) What types (i.e., horizontal, vertical or conglomerate) of mergers were caused by liberalization? The paper proceeds as follows: Section 2 introduces the paper’s basic intuition linking trade liberalization and merger profitability. It discusses a basic example of a merger between two duopolists before and after liberalization. This example clarifies why prior studies have concluded that liberalization reduces horizontal mergers and illustrates that, for any level of cost savings, liberalization actually reduces the incentives to merge. Section 3 expands the duopoly example and considers entry deterrence as a motive for a post-liberalization merger. In this respect, it clarifies under what circumstances domestic firms actually may find it privately beneficial to merge in response to liberalization. Section 4 describes the data set used for the empirical estimations in the paper. It also provides some background information about the trade liberalization program that was implemented in Israel. Section 5 analyzes the extent to which the liberalization has contributed to local mergers. Section 6 concludes the analysis and discusses results.

A Model of Merger Benefits – the Duopoly Example

The Background for the Model

This section clarifies the basic intuition derived from prior theoretical work on trade-liberalization and horizontal merger incidence. Two important studies previously have studied this topic. The first, by Long and Vousden (1995), focuses on how liberalization differently affects cost-reducing and strategic mergers. Their study illustrates that a marginal reduction in the tariff levels is expected to encourage mergers aimed at market power, and discourage mergers that are aimed at cost reductions. However, their model does not fully account for the competitive impact of liberalization, as it considers only a marginal tariff reduction which does not enable entry or exit of new foreign firms. For this reason, their model may overstate the incentives of domestic firms to merge.

The second model, by Vousden and Kanouni (2004), focuses on the impact of liberalization on merger incidence. Their model endogenizes the foreign firm’s entry
decision and illustrates that, for a sufficiently high tariff reduction, foreign firms will enter
the market and reduce any potential merger gains. Their conclusion corresponds to Salant,
Switzer and Reynolds' finding, which holds that market entry reduces merger profitability.
Vousden and Kanouni’s model, however, assumes homogeneity among firms and does not
consider synergies as an alternative merger motive. In this respect, it does not provide any
insight for investigating the cost-reduction motives behind liberalization-induced mergers.

In the model detailed below, I include both cost heterogeneity and entry and exit
decisions of all firms. By incorporating these two features, it is illustrated that the central
link between potential merger gains and removal of entry barriers can be reversed. This is
accomplished in two circumstances. First, liberalization may create additional strategic
motives to merge if the merger enables domestic firms to deter entry. If merger synergies
are sufficiently high, then liberalization may induce more mergers that are aimed at
deterring entry of foreign firms. Second, if foreign advantages are sufficiently high, then
liberalization may induce mergers that enable domestic firms to avoid exit. Both of these
mergers are more likely post-liberalization. Both are attained by including the anticipated
impact of the merger on entry and exit into the merger decision. This section introduces the
paper’s basic intuition linking trade liberalization and merger profitability. It illustrates this
through the simple example of a merger between two duopolists. Section 3 expands the
duopoly example and considers entry deterrence and exit avoidance as motives for a post-
liberalization merger.

The Duopoly Example
The model presented here illustrates how a non-marginal tariff reduction affects a
horizontal merger between two domestic firms. It assumes that a merger decision between
two domestic firms is treated endogenously as a function of its potential to provide gains to
the firms. It is further assumed that there are one foreign firm (firm 0) and two domestic
firms (firms 1 and 2), all selling a single homogeneous good and employing Cournot
conjectures about their rivals' quantities. Both demand and costs are linear. Demand is
represented by \( P = \beta - Q \) where \( Q \) is the market quantity. The quantities of the foreign
and domestic firms are labeled $q_0$ and $q_i$, respectively. Cost is represented by
\[ C_i(q_i) = cq_i + k \]
where $i = 1, 2, 3$, hence it is further assumed that all three firms are homogeneous and subjected to identical, constant marginal costs, $c$, and fixed costs, $k$. I consider firm heterogeneity and different cost structures in the subsequent sections.

The sequence of decisions is modeled as a three-stage simultaneous game as follows. Initially, a tariff reduction takes place in a market where the two domestic firms are present. Following the tariff reduction, domestic firms decide whether to merge or not in the first stage of the game. In the second stage, exit and entry decisions are made. In this stage, the foreign firm decides whether to enter the market or not, and domestic firms decide whether to remain in the market or not. In the third and final stage, quantity competition takes place.\(^6\)

Before proceeding, what a trade liberalization program is should be clarified. Prior to liberalization, a trade barrier must be present to either disadvantage or altogether prevent entry of the foreign firm. In this model, it is assumed that such a barrier is in the form of a per-unit tariff, $t$, which is imposed upon imports of the foreign firm. For low levels of $t$, entry of the foreign firm is not prevented; however, the tariff impacts strategies in the quantity setting game. It contracts reaction curves of the foreign firm and expands reaction curves of the domestic firms.\(^7\) For high levels of $t$, entry of the foreign firm is prevented altogether, and the tariff does not affect the quantity setting game between the domestic firms. This paper focuses upon non-marginal reductions of the tariff level. A non-marginal reduction of $t$ implies that $t$ is reduced from a high to a low level, thus enabling entry of the foreign firm. Prior to trade liberalization, it is explicitly assumed that tariff levels are sufficiently high to prohibit entry. Trade liberalization eliminates the tariffs so that entry is

\[^{6}\text{By including the merger decision in the first stage, the model enables the domestic firms to decide on a merger before any entry or exit have taken place. By merging first, firms can prevent such structural changes if it serves their goals. Also, by incorporating the merger decision first, the model suggests that merger decisions may be more difficult to undo than entry decisions.}\]

\[^{7}\text{As was illustrated by Dixit (1986), this depends on regularity conditions which are satisfied in the case of the linear demand function employed here.}\]
made possible. The model takes this analysis one step further and suggests that entry of a sufficiently advantageous foreign firm also may induce exit of at least one of the two domestic firms. Incorporating such entry and exit possibilities enables us to fully account for the competitive impact of liberalization upon merger profitability in its entirety.

The analysis proceeds as follows: initially a pre-liberalization equilibrium is characterized and a merger-gains function is fitted for this equilibrium. Next, I consider how liberalization-induced entry modifies the market outcome and its respective merger gains. Finally, I demonstrate how different post-liberalization market structures may result due to costly entry and exit. For each different post-liberalization market structure, merger benefits are calculated and compared.

**Mergers in Pre-Liberalization**

Tariffs sufficiently high to prevent entry will enable the two domestic firms to maintain a duopoly. The pre-liberalization equilibrium of this duopoly is given by

\[
Q = \frac{2(\beta - c)}{3}, \quad P = \frac{\beta + 2c}{3} \quad \text{and} \quad q_i = \frac{\beta - c}{3}
\]

Accordingly, profits for each of the domestic firms are \( q_i^2 - k \). If the two firms merge, a domestic monopoly emerges. In this instance, the resulting monopoly equilibrium is

\[
Q = \frac{\beta - c + s}{2}, \quad P = \frac{\beta + c - s}{2}
\]

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8 Without loss of generality, I focus upon non-marginal reductions which completely eliminate the tariff. Long and Vousden (1995) consider the affect of marginal changes which do not induce entry. The affect of such marginal changes can be replicated by either considering how residual tariffs affect the quantity-setting game after liberalization or by considering the affect of a cost disadvantage to the foreign firm. The latter is done in section 3.
where $s \geq 0$ indicates the per unit cost savings that may have resulted from the merger.\footnote{Assuming that mergers generate synergies in the form of per unit cost savings may be crucial to the study of merger endogeneity. I consider and elaborate this point in Ben-Ishai (2005)}

No specific structure is imposed upon $s$. It is assumed, however, that merger synergies do not surpass the unit costs, hence $s < c$. Profits of the merged monopoly are simply $Q^2 - k$.

The benefit function for this merger can be calculated as the difference between the profits of the merged monopoly and the joint profits of the two duopolists prior to the merger, as follows:

\[
G_{\text{pre}} = \left( \frac{\beta - c + s}{2} \right)^2 - 2 \left( \frac{\beta - c}{3} \right)^2 + k
\]

This merger-gains function, $G_{\text{pre}}$, will provide a benchmark for comparing merger gains between the pre-liberalization equilibrium and the post liberalization equilibrium. It assumes that mergers are driven by opportunities to increase the firms’ profits.\footnote{In this setup, the merger gains are limited to a comparison of profits before and after the merger takes place. This type of generalization has been widely adopted. It should be noted, however, that it overlooks other un-modeled parameters such as the cost to merging or the managerial incentives that could provide additional motives for mergers.}

Equation (3) implies that, even for situations where the merger does not generate any cost savings, it still is profitable as it transforms the industry from a duopoly to a monopoly. In this instance, there are no non-merging firms that offset the merger gains by responding to the increased market price. This is consistent with the Salant, Switzer and Reynolds (1983) findings regarding merger profitability, which hold that only mergers that raise sufficiently high synergies or create a monopoly are privately profitable.

**Mergers in Post Liberalization**

Suppose that a trade liberalization program is initiated and that the prohibitive tariff level is reduced in a non-marginal way. As stated before, non-marginal implies that the reduction in the tariffs is sufficiently high to enable entry of the foreign firm. This occurs at a critical
value of the tariff level, \( t^* \), which is calculated below.\(^{11}\) When the firms are homogenous, the post liberalization equilibrium will include both the foreign and two domestic firms. This equilibrium is given by

\[
Q = \frac{3(\beta - c) - t}{4}, \quad q_i = \frac{\beta - c + t}{4}, \quad q_0 = \frac{\beta - c - 3t}{4}
\]

where the foreign firm is disadvantaged in the event that tariffs have not been completely removed (if \( t \) is positive). Profits for the foreign and domestic firms are simply \( q_0^2 - k \) and \( q_i^2 - k \), respectively. From this post-liberalization equilibrium, we can derive the foreign firm’s entry condition. From \( \{c, \beta, t, k \mid \Pi_0 > 0\} \), the foreign firm will enter if

\[
t < t^* \equiv \frac{\beta - c - 4\sqrt{k}}{3}
\]

Hence, \( t^* \) is the critical value for which a tariff reduction would be considered non-marginal. For tariffs higher than \( t^* \), the foreign firm will not enter. For tariffs lower than \( t^* \) or equal to zero, entry of the foreign firm will take place. Thus, the model considers a non-marginal reduction of tariffs as one that reduces \( t \) below its critical value, \( t^* \). In this post-liberalization (post-entry) outcome, if the two domestic firms merge, a new equilibrium will prevail. This equilibrium is characterized by

\[
Q = \frac{2(\beta - c) + s - t}{3}, \quad q_m = \frac{\beta - c + 2s + t}{3}, \quad q_0 = \frac{\beta - c - 2t - s}{3}
\]

\(^{11}\) Although \( t^* \) represents only the critical tariff level, any \( t > t^* \) could be representative of the more general situation where non-tariff barriers prevent foreign entry. In this respect, a non-marginal tariff reduction could be thought of as any liberalization programs that effectively remove entry barriers.
where $q_m$ is the quantity supplied by the merged domestic firm, and profits for the merged firm are $q_m^2 - k$. The post-liberalization merger-gains function is computed as the profits of the merged firm minus the aggregate profits of the unmerged domestic firms. In contrast to the pre-liberalization merger which resulted in a monopoly, the post-liberalization merger results in a foreign-domestic duopoly with merger gains denoted as $G^{pst}$ and amounting to

$$G^{pst} = \left(\frac{\beta - c + 2s + t}{3}\right)^2 - 2\left(\frac{\beta - c + t}{4}\right)^2 + k$$

Comparing the pre- and post-liberalization merger-gains functions ((3) and (7), respectively) allows us to determine the impact of liberalization upon merger profitability. The comparison also enables us to consider the two central issues in merger endogeneity: competitive and efficiency motives. These merger motives are studied with respect to the changes in the market structures, and are summarized in the following two propositions. Proposition 1 focuses upon ‘purely uncompetitive’ mergers; ‘purely uncompetitive’ implies that the merger does not generate any cost savings. Proposition 2 focuses upon ‘efficiency enhancing’ mergers; ‘efficiency enhancing’ implies that the merger generates strictly positive cost savings.

It may be beneficial to review the two sources of merger synergies that distinguish between the purely uncompetitive and the efficiency enhancing mergers. The first source of merger synergies is the retirement of excess capacity and is modeled through the elimination of $k$ from the aggregate cost structure of the merging firms. The second is a reduction in variable costs, which is denoted by subtracting $s$ from the constant marginal costs. Merger profits that are generated by eliminating fixed costs are independent of market outcome. These cost savings provide a uniform incentive to merge in both pre- and post-liberalization, and therefore do not affect the merger-gains comparison. On the other

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12 To prevent confusion in summation between pre- and post-liberalization, pre-liberalization variables are often indexed with the letters ‘pre’ and post-liberalization often indexed with the letters ‘pst’. 
hand, the second source of merger synergies, variable costs, is of course dependent upon market outcomes. Liberalization-induced market changes should affect the merger incentives that are generated by variable costs. Both of these cost savings are incorporated in the model. For the purely uncompetitive merger, $k=s=0$. The efficiency enhancing merger includes strictly positive values both for marginal cost savings, $s$, and for fixed cost savings, $k$.\textsuperscript{[13],[14]}

**Proposition 1.** For a reduction of tariffs sufficient to induce entry by a foreign firm, trade-liberalization programs reduce the private gains of a purely uncompetitive merger between the two domestic firms.

**Proof.** Denote the difference between the pre- and post- liberalization merger gains function of a purely uncompetitive merger as $\Delta G^{un}$. For a merger that produce no synergies ($k=s=0$), $\Delta G^{un}$ reduces to

$$
\Delta G^{un} = G^{pre} - G^{put} = \frac{(\beta-c)^2}{24}
$$

which suggests that a purely uncompetitive horizontal merger between the two domestic firms is more profitable under trade protection than under trade liberalization.

\textsuperscript{13} The independence between capacity and variable costs is peculiar to the linear cost structure assumed here. Although this assumption does not link the *exogenous* level of merger synergies, $s$, to the capital of the merging firms, $k_1 + k_2$, it is advantageous for two reasons. First, it permits us to study mergers in markets with non-fixed aggregate capital. This enables us to study mergers under exit and entry conditions without making further assumptions on how aggregate capital is affected by entry. Second, it permits us to identify efficiency and competitive motives in an additive fashion and hence study their significance independently.

\textsuperscript{14} Fixed cost symmetry also is assumed in the sense that $k$ is equal for both the domestic and foreign firms. This may not necessarily be a valid assumption as one may find entry costs for a firm that already is operating in foreign markets to be lower than those of a new domestic entrant. This, however, is irrelevant to this study as fixed costs do not affect the comparison of domestic merger gains between the different market outcomes.
In proposition 1, strategic motives to merge have been considered. Although it is demonstrated that liberalization leads to a decline in the strategic incentives, it often is presumed that liberalization induces cost-reducing horizontal mergers. This is precisely the focus of proposition 2. It considers merger synergies to study how liberalization affects cost-reducing mergers.

**Proposition 2.** For a reduction of tariffs sufficient to induce entry by a foreign firm, trade-liberalization programs reduce the private gains of a cost-reducing merger between two domestic firms.

**Proof.** Denote the critical value of synergies for which mergers are profitable in pre- and post-liberalization as \( s^{\text{pre}} \) and \( s^{\text{pst}} \), respectively. Equating the merger gains functions, \( G^{\text{pre}} \) and \( G^{\text{pst}} \), with zero I obtain the minimal levels of merger synergies for which mergers are profitable:

\[
\begin{align*}
    s^{\text{pre}} &\equiv \frac{(2\sqrt{2} - 3)}{3} (\beta - c) < 0 \\
    s^{\text{pst}} &\equiv \frac{(3\sqrt{2} - 4)}{8} (\beta - c) > 0
\end{align*}
\]

This indicates that, prior to liberalization, any merger is privately profitable even if it does not generate any synergies. However, post-liberalization, only mergers that generate synergies greater than \( s^{\text{pst}} \) are profitable. Since both \( G^{\text{pre}} \) and \( G^{\text{pst}} \) are increasing monotonic functions of \( s \), then for any plausible level of exogenous cost savings, mergers are more profitable under trade protection than under free trade.\(^{15}\)

According to this example, the duopolists always have a greater incentive to merge under trade protection rather than under liberalization. This is independent of whether or not the merger reduces costs. Hence, liberalization restrains the incentives to merge.

\(^{15}\) Alternatively it could be shown that \( G^{\text{pre}} - G^{\text{pst}} \) is strictly positive for any level of \( s \).
regardless of whether the merger is targeted at increasing market price or at generating cost-savings. To understand why liberalization reduces both of these motives, it may be beneficial to consider why mergers may be profitable to begin with.

As noted before, one of the major impediments to profitable mergers is the recognition that non-merging firms react to the merger. Ultimately for a merger to be profitable, the merging firm either must generate sufficient synergies or increase market price. Farrel and Shapiro (1992) emphasized that the elimination of one of the two merging firms, in itself, is insufficient to increase price. For the market price to increase, the merged firm must contract its output. Contracting output, however, may be offset by non-merging firms (domestic or foreign). Therefore, for the merger to increase price, it must sufficiently contract output to offset any quantity response of non-merging firms. As illustrated below, liberalization may complicate this quantity contraction constraint for the merging firms.

With respect to the competitive motives to merge, the price changes that a purely uncompetitive merger generates can be compared pre- and post-liberalization. Although in both situations the merger increases the price, prior to liberalization there are no non-merging firms that react to the price increase. Post liberalization, the foreign firm increases its output and reduces the effect of the merger on the market price. It is easily shown that mergers generate a higher price effect before liberalization. I denote $\Delta P_{\text{pre}}$ and $\Delta P_{\text{post}}$ as the price changes of an uncompetitive merger pre- and post-liberalization, and demonstrate that liberalization reduces the price increase generated by the merger:

$$\Delta P_{\text{post}} - \Delta P_{\text{pre}} = -\frac{(\beta - c - 2s)}{12} < 0$$

With respect to cost savings, it can be illustrated that for any level of $s$, liberalization reduces the quantity of the merged firm. Denoting $\Delta q_m$ as the changes induced by liberalization in the quantity of the merged firm, I obtain:
It immediately follows that $\Delta q_m < 0$ for any $s$. The unitary cost synergies are applied to less post-merger quantities and, hence, the cost savings that are generated by the merger decline post-liberalization. The duopolist example illustrates that liberalization-induced entry reduces both the potential price increase as well as the potential cost savings that a merger can generate. Accordingly, by inducing entry, liberalization renders mergers less profitable, less efficient and less capable of raising price.

**The Duopoly Example – Strategic Mergers**

The previous section illustrated that the foreign firm finds it profitable to enter the market following liberalization if the tariff levels are reduced below the entry threshold, $t^*$. It was further established that, if such entry takes place, then it reduces the domestic firms’ incentive to merge. This result relied upon two critical assumptions. First, it was assumed that entry is costless. Second, it was assumed that the domestic firms cannot reverse the tariff reduction despite being harmed by it. The current section develops upon these two assumptions. It incorporates two additional factors to better account for the strategic interaction between the domestic and foreign firms. First, it allows for heterogeneity between foreign and domestic firms. Second, it considers the case in which entry and exit are costly. Combining these two factors enables us to study the full competitive impact of liberalization on the decision to merge. Although in this context domestic firms cannot reverse the liberalization program, under certain circumstances they can reverse its adverse impact by merging. This is accomplished either by deterring liberalization-induced entry or by avoiding liberalization-induced exit. Both structural changes are triggered initially by liberalization. Both can be reversed through a merger, after liberalization has taken place.

I change the cost functions so that they account for entry costs and foreign advantage. To incorporate entry costs, it is assumed that $k$ is strictly positive and fully recoverable. Hence, if competition or technology causes the firms to be un-profitable, they then may exit
the market and salvage the capital invested in entry. Additionally, heterogeneity between the foreign and domestic firms is introduced to the model by subtracting $z$ from the foreign firm’s marginal costs. Incorporating these additional parameters into the firms’ profit functions yields $\pi_o = (\beta - Q - c + z - t)q_o - k$ and $\pi_i = (\beta - Q - c)q_i - k$, respectively.

Before considering the impact of these parameters on merger profitability, it would be helpful to establish a couple of relationships. The first relationship focuses upon the link between merger synergies and the foreign firm’s profitability. The second relationship concerns the link between the foreign firm’s cost advantage and the domestic firm’s profitability. In a post-liberalization equilibrium, merger synergies negatively affect the profitability of the foreign firm ($\partial \pi_o / \partial s < 0$). Moreover, for a strictly positive $k$, sufficiently high merger synergies will make the foreign firm’s entry unprofitable. By equating $\pi_o$ with zero we can derive the threshold, $s$, for which a domestic merger will deter entry of the foreign firm. Post-liberalization equilibrium (5) implies that entry of the foreign firm is deterred if

$$s > s^\text{det} \equiv \beta - c - 3\sqrt{k}$$

where $s^\text{det}$ denotes the critical level of merger synergies which would make entry of a foreign firm unprofitable. This implies that, for sufficiently high exogenous synergies, the merger deters the entry of the foreign firm.

Similarly, the second relationship focuses upon the foreign firm’s cost advantage and exit of domestic firms. In the post-liberalization equilibrium, the foreign firm’s cost advantage negatively affects the profitability of the domestic firms. For a sufficiently high foreign firm’s cost advantage, the domestic firms will be unprofitable. For a certain critical value of $z$, both firms cannot remain in the market. In such a situation, one of the two firms will exit the market while the other remains. The remaining firm will benefit from a higher market price as a result of the exit of the competitor. For sufficiently high foreign advantage, however, even a domestic-foreign duopoly will be unattainable and, hence, the
remaining domestic firm also will exit the market. To obtain the threshold value for which both firms will exit the market, I equate the profits of the merged firm in equation (6) with zero, where \( k \) and \( z \) are strictly positive, yet \( s=0 \). This resembles a situation where, post-liberalization, even a domestic-foreign duopoly would be unattainable due to the foreign firm’s cost advantage. Denoting \( z^{st} \) as the critical value of \( z \) for which both domestic firms will exit the market, I obtain that for

\[
(11) \quad z > z^{st} \equiv \beta - c - 3\sqrt{k}
\]

… liberalization will drive both of the independent domestic firms out of the market. These two relationships suggest that, when exit and entry are costly, there are threshold \( s^{\text{det}} \) and \( z^{st} \) for which mergers could serve as a mechanism for changing the post-liberalization market structure. Proposition 3 and Proposition 4 compare merger profitability for such circumstances in the pre- and post-liberalization outcomes.

**Proposition 3.** For merger synergies and entry costs that are sufficiently high to deter the entry of a foreign firm, the trade-liberalization program induces a merger between the two domestic firms.

**Proof.** For synergies surpassing \( s^{\text{det}} \), if the two domestic firms merge, their benefits from their mergers are:

\[
(12) \quad G^{\text{det}} = \frac{(\beta - c + s)^2}{4} - 2 \frac{(\beta - c + z)^2}{16} + k
\]

---

\(^{16}\) I chose to focus the attention here upon the case were the foreign firm’s cost advantage is sufficiently high to induce exit of both domestic firms. It is plausible, however, that for a lower cost advantage, entry of the foreign firm will induce exit of only one of the two domestic firms. Even in this case, however, the remaining firm still may be harmed by an advantageous new entrant. These complexities are characteristic of studies of multiple-firm entry deterrence (see Bernheim for an example), but are not explored extensively here.
where $G^{\text{det}}$ is the merger’s gains function. $G^{\text{det}}$ equals the difference between the profits of a domestic monopoly and the aggregate profits of the domestic firms in a (post-liberalization) three-firm equilibrium. A comparison between the pre- and post-liberalization merger benefits for $s > s^{\text{det}}$ is shown as

\begin{equation}
G^{\text{pre}} - G^{\text{det}} = -\frac{2(\beta - c)^2}{9} - \frac{(\beta - c - z)^2}{8}
\end{equation}

which is strictly negative as long as $z, s < c < \beta$. Thus, if $s > s^{\text{det}}$, domestic firms would find it more profitable to merge after liberalization in order to deter entry of the foreign firm. Of course, the difference between the two merger benefit functions is unaffected by merger synergies ($\frac{\partial (G^{\text{pre}} - G^{\text{det}})}{\partial s} = 0$). This is because both pre- and post-liberalization mergers ultimately result in the same merged domestic monopoly and, therefore, benefit from the same cost reduction.

Similarly, for cost advantages of the foreign firm surpassing the critical level, $z''$, a merger can prevent the exit of the two domestic firms. In this instance, the merger benefits are the difference between the profits of the merged firm in domestic-foreign duopoly and the profits of the two firms if they exit the market. By exiting the market, the two domestic firms are able to recover fixed costs. Hence, a merger that enables the two firms to avoid exit still includes two types of benefits: future operation profits and elimination of fixed costs. Denoting its gains as $G''$ I obtain:

\begin{equation}
G'' = \frac{(\beta - c + 2s - z)^2}{9} + k
\end{equation}
For sufficiently high cost advantages of the foreigner, one can compare the difference in the merger benefits between pre-liberalization and post-liberalization exit avoidance merger gains. This is the focus of Proposition 4.

**Proposition 4.** For cost advantages of the foreign firm sufficiently high to drive both domestic firms out of the market, a trade liberalization program induces a merger between the two domestic firms.

**Proof.** Instead of directly comparing \( G^{pre} \) to \( G^{er} \), which may be cumbersome, I obtain critical levels of merger synergies which are sufficient for the pre-liberalization and exit-avoidance mergers to be profitable. Prior to liberalization, it already was established that \( s^{pre} \) was the critical level for profitability of a merger in Proposition 2. For the exit-avoidance merger, I obtain \( s^{er} \), the minimal level of synergies for merger profitability, by equating \( G^{er} \) with zero:

\[
(15) \quad s^{er} = \frac{(2\sqrt{2} - 3)}{3}(\beta - c) < s^{pre}
\]

… which is smaller than \( s^{pre} \) for any \( z > z^{er} \). In this respect, for a sufficiently high foreign cost advantage to induce exit of both domestic firms, the domestic firms would find it more profitable to merge after liberalization in order to avoid exit.

Combining exogenous merger synergies and cost heterogeneity between foreign and domestic firms, the circumstance in which liberalization actually would induce horizontal mergers can be mapped. It is demonstrated that for sufficiently high advantages of the foreign firm, mergers could be more profitable after liberalization as they enable domestic firms to avoid exit. Similarly, for sufficiently high merger synergies, liberalizing trade could make mergers more profitable as they enable domestic firms to deter foreign entry. these instances explain why liberalization of trade actually will induce more horizontal mergers. In the absence of a combination of such synergies and heterogeneity, domestic
mergers will not change industry structure and, therefore, will remain less profitable after trade liberalization.

It is important to note that the domestic firms found it more profitable to merge following liberalization, despite the decline in any potential market power. In both mergers, liberalization restricted both potential price increases of the merger as well as potential cost savings. However, in both cases liberalization also affected the firms’ opportunity costs of not merging. That is, in both circumstances liberalization created a more competitive situation in which significant losses would have been endured by the firms had they not merged. In the foreign-deterrence merger, the merger results in an identical equilibrium both before and after liberalization. However, the merger is more profitable after liberalization, because firms bear significant losses by not merging. In the exit-avoidance merger, the end result of the merger is different before and after liberalization. Prior to liberalization, the merger creates a monopoly. Post liberalization, the merger results in a foreign-domestic duopoly. The merger, however, is more profitable after liberalization because the domestic firms are driven out of the market if they do not merge. This intuition suggests that exogenous changes in market structure affect both direct-gains of a merger as well as the opportunity costs of not merging.

I consider this intuition in a formal model. It assesses whether entry of an additional competitor also would reduce the incentives to merge in more competitive settings. Specifically, the duopoly model is generalized to consider the case in which a finite number of domestic firms compete in the market prior to entry of a foreign competitor. The model suggests that the two circumstances considered above only are incidents of a more general set of situations in which the decision to merge may be state dependent. State dependence implies that exogenous factors may affect the merging firms’ profits if a merger does not take place, but may not necessarily affect the merger’s final outcome. These factors may include the initial number of firms in the market and exogenously-induced changes in the number of competitors. These more general circumstances suggest that there is an opportunity cost of not merging, which may be state-contingent, and are further investigated in Ben-Ishai (2005).
Data Sources and Background

The liberalization program that is used to test the impact on merger activity was implemented in Israel in 1993. I now provide some background about this program and about the data collected for the estimations in this section. In Section 5, the empirical analysis is presented and discussed.

The trade liberalization program originated from an Israeli cabinet decision in 1992. In order to enable foreign competitors to enter the manufacturing industries, a very comprehensive reform of trade barriers was undertaken. The program implemented a ‘tariffication’ process that temporarily replaced non-tariff barriers with tariffs. Estimates of the non-tariff barriers initially were incorporated into a pre-liberalization tariff level. Next, these pre-liberalization tariffs temporarily were increased and non-tariff barriers simultaneously removed. The temporary pre-liberalization tariffs then were gradually removed over a five to seven year period beginning in 1992. At the outset of the liberalization program, industries excluded from the program maintained a tariff level ranging from 8% to 12%, while industries participating in the program were subjected to (temporary) tariffs ranging from 20% to 75%. This tariffication process provided a quantitative ‘snap-shot’ of all trade barriers (both tariff and non-tariff) prior to the liberalization program. The analysis here employs these tariffs as proxies for the degree of pertaining trade barriers prior to liberalization. Consequently, liberalization conducted through tariffication was beneficial for two reasons: it was comprehensive in scope and it provided a direct estimate of all tariff and non-tariff barriers.

Another advantage of the liberalization program used in this paper is that it was conducted unilaterally. A multilateral trade agreement may have enabled domestic firms to enter foreign markets following a reciprocal reduction in tariffs. This is not the case in a unilateral tariff reduction in which the merger decision is unaffected by demand changes from foreign markets. Additionally, the use of industry-level data in this study bears implications for recent empirical attempts to explain merger endogeneity on the basis of industry-specific shocks. This strand of the literature, surveyed in Andrade, Mitchell and Stafford (2002), addresses one of the most consistent empirical regularities in mergers and
acquisitions, namely, the tendency of mergers and acquisitions to cluster, both in terms of timing and industry. Such clustering of merger incidence often is explained as a basic reaction to industry-specific shocks. This paper investigates whether trade-liberalization, which could be viewed as such an industry-specific shock, has induced greater merger incidence. Finding that liberalization causes time or industry clustering could provide further support for these recent attempts to explain merger wave endogenously.

**Mergers and Acquisitions**

Merger Registry data of the Israel Antitrust Authority were used to identify merger transactions over the 1993–2000 period. From the 1167 listed mergers in the registry, 260 mergers included at least one manufacturing firm. Affiliation in manufacturing industries was based upon the Dun and Bradstreet (“D&B”) Business Directory, which is classified according to the Standard Industrial Classification (“SIC”). Table 1 describes the primary database on merger activity for this study. It demonstrates that the level of merger activity is considerably low. Of the 157 4-digit industries included in the sample, only 88 experienced any merger activity over the 8-year period. Overall, industries included in the study experienced an average of 1.6 mergers. In terms of the mergers to firms ratio, this corresponds to 2% of all firms annually. Mulherin and Boone (2001) reported that merger incidence in the U.S. has reached an average of 2.9% per firm-year for their study of acquisitions in the 1990’s. Using an equivalent approach, Mitchell and Mulherin (1996) estimated merger activity at 4.2% per firm-year for their data from the 1980’s. These comparisons imply that there is a low level of merger occurrence in this study. This relative low level of merger occurrence also is consistent with cross-country merger comparisons conducted by La Porta et al (1988) and Rossi and Volpin (2003). In both studies, merger activity in Israel was found to be relatively low compared to other developed economies.

The availability of merger transactions in the Merger Registry from 1993 onwards limits this study to the post-liberalization period. This data limitation could question the causality of any correlation found between mergers and exposure to trade. Hypothetically, such a correlation also could arise if industries exposed to trade have an exogenously higher
tendency toward mergers. However, in case that the liberalization program is found to have a non-permanent effect, then any such correlation can be sensibly ruled out. Specifically, any correlation between fixed industry effects and pre-existing tariffs is unreasonable if it dissipates over-time.

**Market Structure and Definitions**

The D&B Directory was employed to measure the number of firms in each industry. These are summarized in Table 2, which indicates that an average of 10.6 firms operated in each (4-digit) industry in 1992. Table 2 also suggests that the average number of firms declines both for industries participating in the trade liberalization program and for industries not participating. Overall, the average number of firms declined from eleven in 1992 to eight in 1999. Considering the modest number of horizontal mergers at the (4-digit) industry level, this reduction most likely was driven by exit rather than by horizontal mergers. Of the average decline of three firms per industry, horizontal mergers could account for only 0.22 firms reduced. Therefore, roughly one of every ten firms chose a merger as an exit mechanism. It is further shown that the reduction in the number of firms is significantly higher for participating industries. These observations suggest that exit of domestic firms was frequent. However, mergers were not the primary mechanism of such exits.

The observed reduction in the number of firms is apparently at odds with previous findings by Gabai and Rob (1998) who documented a decline in the concentration of industries exposed to partial liberalization in the 1980’s. One possible explanation for the divergence between the Gabai and Rob study and the data collected here is that data for this study include only local manufacturing firms while the data collected for the Gabi and Rob study include only local manufacturing firms while the data collected for the Gabi and Rob

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17 An average of 0.22 of the 2.8 decline in the number of firms is attributed to horizontal mergers

18 A comparison to the Gabai and Rob finding is somewhat problematic for a few reasons. While Gabai and Rob employ CR4 ratios to study changes in concentration, data for this study record only changes in the number of firms. Additionally, Rob and Gabai utilized a sample of 14 industries while the span of this study is substantially greater. It is interesting, however, to compare these two studies even merely as a stylized facts comparison.
study included both foreign and domestic retailers. In this respect, these observations do not conflict. It is possible, even likely, that liberalization both had reduced the number of local manufacturing firms and increased the total number of retailers. In this respect, the stylized facts suggest that liberalization has triggered both entry of foreign firms as well as exit of domestic firms.

**Merger Classification**

Identification of mergers as horizontal is central for studying the role of competition as a motive for mergers. While different approaches of defining horizontality obviously might produce different amounts of horizontal mergers, in this sample the magnitude of horizontal mergers was exceptionally sensitive to the definition adopted. Identifying transactions as horizontal was based upon two different approaches. The first approach used the SIC market classification. In this approach, if the two merging firms were listed under the same SIC 4-, 3- or 2-digit markets, then the transaction was classified as horizontal.\(^\text{19}\) The second approach was based upon reported merger characteristics of the Merger Registry. The merger registry identifies horizontal mergers according to an antitrust market definition. In principal, this means that if the products of the two merging firms could be viewed as substitutes in demand by the Antitrust Authority, then the merger will be classified as a horizontal merger.\(^\text{20}\) As Table 5 illustrates, the different measures of horizontality produced substantially different levels of horizontal mergers. Notably, the antitrust market definition was most closely related to the 3-digit resolution of the SIC classification. For the purpose of analyzing the effect of trade liberalization, I utilize all measures of horizontality in the study.

\(^{19}\) Guenther and Rosman (1994) studied the validity of 4-digits and 3-digits SIC classification for empirical research. Using the COMPUSTAT data, they found a high correlation of intra-industry market returns and low variance of intra-industry financial ratios. This resemblance has reinforced the validity of the SIC classification for market identification in empirical research.

\(^{20}\) Interestingly, Pittman and Werden (1990) compared 4-digits SIC classified markets to the markets identified by the U.S. Justice Department in merger cases. They concluded that the former are far larger than the antitrust markets.
Vertical and conglomerate definitions were based upon commodity flow charts. The commodity flows determine if a merger is vertical based upon the input transfer between the industries in which the merging firms operate. According to this methodology, a merger will be considered vertical if one merging firm operates in an industry where at least 5% of its inputs originate from the industry of the other merging firm. In order to avoid classifying 3-digit horizontal mergers as vertical ones, the input-output tables were applied to horizontal mergers at the 4-digit classification. Conglomerate mergers consisted of all mergers which are neither horizontal (at the 2-digit level) nor vertical. The input-output tables are taken from Fan and Goyal (2002), who studied the patterns of vertical mergers in the 1990s.

**Trade Barriers and Program Participation**

Annual Reports of the Joint Ministerial Committee for Trade Liberalization were used to identify the manufacturing sectors that have been affected by the liberalization program. These reports were supplemented by annual testimony held at the Parliamentary Sub Committee for Economics and the Annual Customs Ordinance publication to determine pre-program trade barriers. In total, of the 157 manufacturing industries included in the study, 83 were subjected to trade liberalization. The remaining 74 non-participating industries consist of two groups. The first group includes tradable commodities which did not exhibit a high level of barriers and were thus excluded from the program. The other control group consists of commodities that are unclassified under the U.N. Harmonized System codes, and thus identified as non-tradable commodities. Tariffs were classified according to the U.N. Harmonized System for International Trade. Matching SIC industry codes to Harmonized commodity classification was based upon the U.S Census Bureau OEI schedules. This matching process resulted in an average of a 36% tariff for participating industries prior to liberalization.\(^{21}\)

\(^{21}\) In most cases, for every 4-digit SIC code numerous Harmonized commodity classifications were found. However, for the majority of the cases a uniform tariff was reported. In cases where an
Results

Program Participation and Merger Activity

The goal of estimations in this section is to examine if an industry’s exposure to foreign trade affects the tendency to merge. If any such effect holds, then the number of mergers occurring between local firms in any industry could be specified as a function of the exposure to trade liberalization, the number of firms, and additional industry specific explanatory variables. That is,

\[(16) \quad M_i = f(LIB_i, N_i, X_i)\]

where \(M_i\) denotes the number of mergers occurring in industry, \(i\); \(LIB_i\) is a dummy variable for trade exposure; \(N_i\) is a log of the initial number of firms; and \(X_i\) denotes additional explanatory variables such as the initial tariff level for each exposed industry, dummy variables for 2-digit SIC industry affiliation, and proxies for the industry’s degree of trade vulnerability. The specification reported in equation (16) serves as the basis for the main regression framework in this section. The analysis proceeds as follows: Tables 3-4 present different estimations for testing the effect of trade liberalization on merger activity; Table 3 presents descriptive statistics regarding the distribution of mergers and trade liberalization; Table 4 reports the basic regressions of merger activity on participation in the liberalization program.

In analyzing whether liberalization is a source of significant changes in merger activity, the first step is to present a simple bivariate distribution of mergers and program participation as reported in Table 3. Three different variables are included in Table 3: the number of mergers, merger-intensities, and the fraction of mergers in liberalized industries. The merger-intensity variables are formed simply by dividing the number of mergers by the SIC industry was matched with more than one Harmonized commodity code with different tariff rates, the most frequent rate was recorded.
number of initial competitors for each 4-digit industry. The number of mergers is reported as the sum of all merger activity in the 83 exposed and the 74 unexposed industries. The fraction of mergers simply is the number of mergers occurring in liberalized industries as a fraction of the total number of mergers. These three variables were measured annually from 1992 to 2000. Evidently, the fraction of mergers in exposed industries rejects the hypothesis that mergers are uniformly distributed across time. The average participating fraction dropped sharply in 1997 from an average of 0.7 to that of 0.5. This decline illustrates that the share of mergers occurring in participating industries initially was high but declined over the years. A key observation that emerges from Table 3 is that, if trade liberalization affects merger activity, such an effect may subside after approximately four years.

The next step tests explicitly whether the heightened merger activity is induced by exposure to foreign competition. Specifically, the regression framework attempts to explain this hypothesis on the basis of merger-count data. This merger-count variable raises two possible estimation problems. First, as in most sources of count data, merger count consists of non-negative integer values. One obvious shortcoming of using linear models to estimate a non-negative response variable is the possibility that, for some level of the explanatory variables, the model’s predicted values could be negative.\(^{22}\)

Second, inclusion of the number of firms, a necessary explanatory variable, also raises a possible endogeneity problem. This endogeneity arises from the constraining effect that the number of firms has over the number of potential mergers. At any given point in time, the number of potential horizontal mergers is limited to the number of firms minus one. However, as horizontal mergers take place, the number of actual firms declines. Therefore, the number of firms also is determined partly as a function of the number of mergers. Obviously, this could cause a simultaneous dependence of the observed number of firms on the observed number of mergers. Nonetheless, for cross-sectional data in which the number of mergers is estimated over a certain duration and the number of firms is

\(^{22}\) A simple logarithmic transformation of the number of mergers could have resolved this problem. However, in 69 of the 157 observations there were 0 mergers recorded.
recorded as a constant prior to that duration, inclusion of the number of firms should not raise such a simultaneity problem.

In a fashion similar to recent studies of mergers, I account for these problems with two different methodological approaches. The first approach calculates merger-intensity variables and fits Tobit estimators. The second approach fits Poisson estimators for counted variables of strictly positive integers. Both techniques account for the strictly positive values of the response variable. Both techniques incorporate the number of firms in the regression. The Tobit estimation normalizes the number of mergers by the number of firms and uses merger intensities as a dependent variable. The Poisson regression includes the natural log of the number of firms as an independent variable.

Table 4 presents the central estimation for this paper. The table is divided into three different panels reporting both the Tobit and Poisson estimates for three different time intervals. The dependent variables in Panel A aggregate merger activity for the entire duration of the sample. The dependent variables in Panels B and C aggregate mergers occurring in the initial and final four years of the sample, respectively. A fundamental result that emerges from Table 4 is that merger incidence increased in industries participating in the trade liberalization program. Both of the Poisson and Tobit regressions, reported in Table 4, demonstrate that exposure to trade had a positive and significant effect upon merger activity.

For the entire sample duration reported in panel A, the Poisson coefficient for the binary trade-exposure variable is positive and significant. The Tobit coefficient for the trade exposure is positive, yet insignificant. Additionally, the two estimation methods produce considerably different results when applied to the entire duration of the sample. However, focusing upon the initial 4 years of the sample, panel B demonstrates that both Poisson and Tobit estimations produce positive and significant coefficients. The magnitude of these coefficients increases slightly in comparison to the entire sample. This implies that, during the initial phase of the program, exposure to imports had a stronger positive effect on merger activity than later. For the initial 4 years of the program, trade exposure generated a marginal effect of 0.44 out of an average of 0.9 mergers in exposed industries.
This marginal effect corresponds to roughly one merger out of every two mergers that were observed in exposed industries. Interestingly, the effect was significant and positive only for the initial 4 years of the sample and tended to dissipate in the last four years. This decline is evident in the insignificant and even negative coefficients of trade exposure in panel C.²³

The estimations in Table 4 also provide some insight into the relationship between the number of firms and merger incidence. Although this relationship is not the topic of this paper, it is interesting to note that consistently throughout the estimations, the coefficient for the log number of firms is positive, yet less than one. This indicates that, in both the Poisson and Negative Binomial models, the effect of the number of firms is decreasing in proportion. Hence, less concentrated industries experience proportionately fewer mergers.

The estimations reported in Table 4 could be summarized into three primary results. First, liberalization is found to have a positive effect upon mergers. In this respect, the removal of trade barriers was found to induce merger activity rather than reduce it. Second, the effect of liberalization tends to subside following the initial four years of the program. Hence, it effects mergers in a non-permanent way. This observation may prove relevant in determining whether any endogeneity could be reasonably attributed to fixed industry effects. Finally, the liberalization’s fading-out effect occurred while the trade liberalization program was still taking place. This recognition, however, may be anticipated since the gradual tariff reduction was announced prior to the beginning of the program. In estimations not included here, I discuss additional specifications to verify the robustness of the effect upon merger activity. Overall, these specifications corroborate the basic findings presented in Table 3 and Table 4.

²³ In unreported results, I regress the change in the number of mergers between the two periods \( \Delta M_i = M_{1992-96} - M_{1997-2000} \) on the dummy variable for trade exposure. This regression produces a negative coefficient for the LIB variable, and therefore confirms that liberalization had an immediate impact only during the initial 4 years.
Program Participation and Merger Type

The main emphasis of this paper has been to examine the anticipated role of foreign competition on the decision to merger. In prior estimations as well as the duopoly example, the underlying factor linking liberalization and mergers was the reduction of potential market power and, hence, potential merger gains. While such a reduction was believed to (negatively) affect merger gains, the discussion of its impact was naturally limited to horizontal mergers. In addition to the market power conjecture, alternative and perhaps less recognized explanations may be considered on the basis of effort distortion. These explanations may imply that trade barriers induce effort distortions on the part of management and employees of domestic protected firms, and that one way to resolve such distortions following liberalization is through mergers and acquisitions. In contrast to the market power consideration, the effort-distortion conjectures relate to all types of mergers. These alternative conjectures for post-liberalization mergers are implicitly studied in this section. Specifically, the intent of this section is to investigate whether liberalization has impacted all types of mergers, or just horizontal mergers. The analysis in this section particularly tests whether the composition of merger types has changed as a result of exposure to foreign competition. Considering that in the previous sub-section liberalization was found to have an impact on the combined merger activity, the current analysis investigates whether such changes were driven by horizontal mergers. The analysis proceeds as follows: Table 5 presents the different measures of horizontal mergers; Table 6 analyzes the impact of liberalization on the different subset of merger types; additionally, Table 6 also tests for changes in the composition of mergers in response to trade liberalization.

As demonstrated in Table 5, the number of horizontal mergers is exceptionally sensitive to how horizontality is defined. Depending upon different categorizations, horizontal mergers can range from 22% up to 50% of all merger activity. However, studying the effect of liberalization on horizontal mergers, Table 5 illustrates that the different categorizations do not influence the effect of liberalization. Evidently, regardless
of how horizontal mergers are defined, liberalization does not significantly change the composition of horizontal mergers in the sample.

Classification of horizontal mergers according to the 2-digit resolution provides estimates that are similar in magnitude to recent merger studies. Using the 2-digit definition, 50% of the mergers in the sample are horizontal. This finding is comparable to the 42% and 54% found by Andrade Mitchell and Stafford (2001) and by Filson and Songsamphant (2002), respectively. The remaining mergers in this sample consist of 13% vertical mergers and 37% conglomerate mergers. This division of conglomerate and vertical mergers resembles the conglomerate and vertical compositions observed in other merger studies. Gugler et al (2002) applied similar commodity-flow data to distinguish between conglomerate and vertical mergers in a large sample of mergers taken from Thompson Financial Securities. In their data set, conglomerate mergers accounted for 54% while vertical mergers represented 4% of all mergers.

Table 6 reports regressions based upon these merger-type classifications. Two methods are adopted to establish what types of mergers are induced by liberalization. First, each subset of horizontal, vertical and conglomerate mergers is regressed on the liberalization dummy. Second, the fraction of horizontal firms is regressed on the liberalization dummy in the grouped data. Panel A regresses the different subsets on trade exposure. Formally, the regression framework is identical to the approach taken in Table 4. For this purpose, the three subsets of merger types are aggregated for the 1993-1996 subset.

Despite the anticipated significance of the market power hypothesis, the coefficients for the dummy variable in panel A suggest that liberalization induces all types of mergers. Marginal effects of the horizontal and conglomerate mergers are of nearly equal magnitude. Including vertical mergers, the coefficient of non-horizontal mergers is even higher. Coefficients for both vertical and conglomerate mergers are nearly significant with a
probability value of 0.11. Joint significance tests for the combined three types also are positive as indicated in Table 4.\(^{24}\)

Panel B regresses the fraction of horizontal mergers on program participation for the grouped merger data. In this instance, horizontal to all-merger ratios are regressed as follows.

\[(17) \quad HR_i^* = \beta_0 + \beta_1 LIB_i + u_i\]

where \(HR_i^* = \text{Horizontal}_i / \text{All}_i\) is the latent variable for the horizontal merger fraction. This estimation produces insignificant results implying that liberalization does not change the composition of mergers. It can be concluded that horizontal mergers respond to liberalization proportionately to non-horizontal mergers.

Earlier studies have suggested that exposure to foreign competition could limit the gains and likelihood of horizontal mergers. Such limitation was believed to be the central effect of liberalization on mergers. The estimation in this section, however, contradicts this conjecture. It is shown that horizontal mergers are, in fact, encouraged by trade liberalization. More importantly, horizontal mergers are subjected to an impact proportional to non-horizontal mergers. These results may indicate that an additional merger motive was triggered by liberalization. Moreover, the uniform response of all types of mergers questions why a reduction of market power induces mergers of all three types.

**Summary**

Estimating the relative significance of the different factors that affect merger decisions often has proven to be empirically difficult. This is partially because there are few opportunities in which merger incentives can be clearly recognized and isolated. In this paper, it was argued that trade liberalization provides an excellent opportunity to study the

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\(^{24}\) Once divided into the three different merger types, data for merger activity in 1993-1996 is quite thin. This is reflected by the exceptionally low averages of mergers per industry as indicated at the bottom of panel A.
A market power incentive to merge. It explicitly removes an entry barrier and reduces any gains that are associated with post-merger monopoly rents. Hence, it could be argued that liberalization affects competition, but it does not necessarily produce a systematic change in other merger motives.

In accordance with one of the central results of merger endogeneity models, it was anticipated that trade liberalization would necessarily reduce the number of observed horizontal mergers. With this hypothesis in mind, the paper set out to study a highly comprehensive trade liberalization program in which numerous trade barriers have been removed and entry of foreign firms has been observed. Using a very simple regression framework, I observed that liberalization actually induces rather than reduces horizontal merger activity. Such an observation contradicts the anticipated role of competition in discouraging horizontal mergers. It could result, however, from overlooking the possibility that mergers may be strategically carried out in order to modify the post-liberalization market structure. A canonical Cournot model that accounts for exit and entry also was included in the paper to study this possibility. It suggests that domestic firms may find it more profitable to merge after liberalization, if the merger will deter the entry of the foreign firm or if, alternatively, it will enable the firms to avoid exit. Such behavior could be profitable if merger synergies are sufficiently high or if foreign firms are sufficiently advantageous.

However, the estimations produced another conflicting result that remains unexplained even if mergers are strategic: liberalization increases all types of mergers, including vertical and conglomerate mergers. This result suggests that removal of an entry barrier actually induces mergers that are not necessarily horizontal in nature. It implies that, for any horizontal-specific merger motive, no significant increase in merger incidence was observed. Hence, horizontal as well as vertical and conglomerate mergers may have increased post-liberalization in a uniform way.

The analysis presented in this paper suggests that, despite the horizontal-specific conjectures, liberalization induces all types of merger activity. This result questions the very common notion that liberalization-induced mergers are a product of either synergies or
monopoly rents. Furthermore, to the extent that post-liberalization mergers are taking place in response to changes in the competitive environment, such changes may lead into strategic mergers that are targeted either at preventing entry or avoiding exit. With respect to merger policy, this implies that it may be more appropriate to conduct an individual study into the causes of each post-liberalization merger, rather than to adopt a broad policy that dismisses their perceived competitive impact altogether.
References


Table 1. Overall Merger and Takeover Activity during 1993-2000

This table presents aggregated data of 157 4-digits SIC Industries. Percent exposed presents the fraction of Industries participating in the trade exposure program.

<table>
<thead>
<tr>
<th>2-Digits SIC Code</th>
<th>Number of Industries</th>
<th>Number of Firms</th>
<th>Mergers</th>
<th>Percent Exposed</th>
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<tr>
<td>22</td>
<td>Textile Mill Products</td>
<td>15</td>
<td>167</td>
<td>33 3 0.73</td>
</tr>
<tr>
<td>23</td>
<td>Apparel and Other Textile Products</td>
<td>19</td>
<td>160</td>
<td>16 0 0.95</td>
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<td>24</td>
<td>Lumber and Wood Products</td>
<td>6</td>
<td>39</td>
<td>5 4 0.33</td>
</tr>
<tr>
<td>25</td>
<td>Furniture and Fixtures</td>
<td>7</td>
<td>71</td>
<td>7 6 0.86</td>
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<td>Paper and Allied Products</td>
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<td>143</td>
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<td>217</td>
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<td>6</td>
<td>3 1 0.00</td>
</tr>
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<td>130</td>
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<tr>
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<td>Leather and Leather Products</td>
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<td>43</td>
<td>6 3 1.00</td>
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<td>6</td>
<td>34</td>
<td>11 5 0.83</td>
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<td>22 4 0.15</td>
</tr>
<tr>
<td>34</td>
<td>Fabricated Metal Products</td>
<td>26</td>
<td>290</td>
<td>12 5 0.35</td>
</tr>
<tr>
<td>35</td>
<td>Industrial Machinery and Equipment</td>
<td>8</td>
<td>52</td>
<td>17 6 0.25</td>
</tr>
<tr>
<td>36</td>
<td>Electronic and Other Electronic Equipment</td>
<td>17</td>
<td>144</td>
<td>33 10 0.53</td>
</tr>
<tr>
<td>38</td>
<td>Instruments and Related Products</td>
<td>2</td>
<td>33</td>
<td>1 0 0.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>157</td>
<td>1671</td>
<td>260 76 0.52</td>
</tr>
</tbody>
</table>
Table 2. Structural Changes and Trade Liberalization

This table presents the number of industries participating in the trade liberalization program and the average number of firms for each industry. The tabulation is based on 4-digits SIC classified Industries.

<table>
<thead>
<tr>
<th></th>
<th>Number of Industries</th>
<th>Number of Firms in 1992</th>
<th>Number of Firms in 1999</th>
<th>Change in Number of Firms</th>
<th>Number of 4-Digit Horizontal Mergers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industries Exposed to Foreign Trade</td>
<td>83</td>
<td>10.4</td>
<td>7.3</td>
<td>-3.08</td>
<td>0.29</td>
</tr>
<tr>
<td>Non-participating Industries</td>
<td>74</td>
<td>10.8</td>
<td>8.3</td>
<td>-2.61</td>
<td>0.15</td>
</tr>
<tr>
<td>Total</td>
<td>157</td>
<td>10.6</td>
<td>7.8</td>
<td>-2.86</td>
<td>0.22</td>
</tr>
<tr>
<td>Significance Levels for means inequality t-test</td>
<td>0.372</td>
<td>0.211</td>
<td>0.071</td>
<td>0.094</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Bivariate Distribution of Mergers and Liberalization

Merger data is presented as the sum of mergers in all industries. Merger intensities are calculated for each 4-digit industry as the number of mergers divided by the number of firms. The Merger intensities are presented as averages.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mergers in Exposed Industries</td>
<td>19</td>
<td>15</td>
<td>15</td>
<td>33</td>
<td>13</td>
<td>29</td>
<td>21</td>
<td>9</td>
<td>154</td>
</tr>
<tr>
<td>Mergers in Unexposed Industries</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>16</td>
<td>11</td>
<td>23</td>
<td>26</td>
<td>9</td>
<td>106</td>
</tr>
<tr>
<td>Total Number of Mergers</td>
<td>28</td>
<td>24</td>
<td>18</td>
<td>49</td>
<td>24</td>
<td>52</td>
<td>47</td>
<td>18</td>
<td>260</td>
</tr>
<tr>
<td>Fraction of Mergers in Participating Industries</td>
<td>0.68</td>
<td>0.63</td>
<td>0.83</td>
<td>0.67</td>
<td>0.54</td>
<td>0.56</td>
<td>0.45</td>
<td>0.50</td>
<td>0.59</td>
</tr>
<tr>
<td>Merger Intensity in Exposed Industries</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.06</td>
<td>0.03</td>
<td>0.05</td>
<td>0.04</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td>Merger Intensity in Unexposed Industries</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.04</td>
<td>0.05</td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Table 4. Regression Merger Activity on Trade Liberalization

Merger intensities are calculated as the ratio of mergers to the number of firms for each industry. Panel A regresses the measures of merger activity over the entire eight years of the sample. Panel B presents the same regressions for a sub-sample of mergers occurring during 1993 to 1996. Finally, Panel C regresses merger activity over 1998-2000. All estimations include the 157 industry level observations. T-statistics are in parentheses, significance levels of 5 and 10 percent are denoted * and ** respectively.

<table>
<thead>
<tr>
<th>Panel A: Mergers Occurring in 1993-2000</th>
<th>Number of Mergers (Poisson)</th>
<th>Merger Intensity (Tobit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Number of Firms</td>
<td>0.73 **</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(8.6)</td>
<td>(1.5)</td>
</tr>
<tr>
<td>Exposed Industries</td>
<td>0.29 **</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(2.3)</td>
<td>(1.5)</td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.120</td>
<td>0.009</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>157</td>
<td>157</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Mergers Occurring in 1993-1996</th>
<th>Number of Mergers (Poisson)</th>
<th>Merger Intensity (Tobit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td>0.66 **</td>
<td>0.16 **</td>
</tr>
<tr>
<td></td>
<td>(5.3)</td>
<td>(3.3)</td>
</tr>
<tr>
<td>Exposed Industries</td>
<td>0.68 **</td>
<td>0.16 **</td>
</tr>
<tr>
<td></td>
<td>(3.5)</td>
<td>(3.3)</td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.10</td>
<td>0.085</td>
</tr>
<tr>
<td>N. Observations</td>
<td>157</td>
<td>157</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Mergers Occurring in 1997-2000</th>
<th>Number of Mergers (Poisson)</th>
<th>Merger Intensity (Tobit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Firms</td>
<td>0.80 **</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(6.8)</td>
<td>(-0.67)</td>
</tr>
<tr>
<td>Exposed Industries</td>
<td>-0.02</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(-0.16)</td>
<td>(-0.67)</td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.09</td>
<td>0.002</td>
</tr>
<tr>
<td>N. Observations</td>
<td>157</td>
<td>157</td>
</tr>
</tbody>
</table>
Table 5. Trade-Liberalization and Horizontal Mergers

This Table Presents ratios of Horizontal mergers to all other mergers according to three different classifications. 3-Digit SIC's refer to mergers occurring between two firms operating in the same 3-digit SIC classification. The 2-digit SIC's refer to mergers occurring between two firms operating in the same 2-digit SIC classification. Antitrust Market Definition was only available for 1997-1998 and it relies on estimation of demand elasticities.

<table>
<thead>
<tr>
<th>2-Digits SIC Classifications</th>
<th>All</th>
<th>Horizontal</th>
<th>Others</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industries Participating in Liberalization</td>
<td>154</td>
<td>74</td>
<td>80</td>
<td>0.48</td>
</tr>
<tr>
<td>Non-participating Industries</td>
<td>106</td>
<td>55</td>
<td>51</td>
<td>0.52</td>
</tr>
<tr>
<td>All Industries</td>
<td>260</td>
<td>129</td>
<td>131</td>
<td>0.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-Digits SIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
</tr>
<tr>
<td>Industries Participating in Liberalization</td>
</tr>
<tr>
<td>Non-participating Industries</td>
</tr>
<tr>
<td>All Industries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4-Digits SIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
</tr>
<tr>
<td>Industries Participating in Liberalization</td>
</tr>
<tr>
<td>Non-participating Industries</td>
</tr>
<tr>
<td>All Industries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antitrust</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
</tr>
<tr>
<td>Industries Participating in Liberalization</td>
</tr>
<tr>
<td>Non-participating Industries</td>
</tr>
<tr>
<td>All Industries</td>
</tr>
</tbody>
</table>
Table 6. Regression Mergers Types and Horizontal Fraction on Program Participation

This Table performs regression analysis corresponding to the regressions conducted in Table 4 for the horizontal mergers. Panel A regresses the merger types subsets on program participation. For this purpose, both 2-digit and 3-digit measures of horizontal mergers are employed in the 1993-1996 sample Panel B regresses the fraction of horizontal mergers on program participation.

Panel A: Regressing Merger on Trade Liberalization

<table>
<thead>
<tr>
<th></th>
<th>Horizontal (2-Digit)</th>
<th>Conglomerate</th>
<th>Vertical</th>
<th>Non Horizontal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Industries</td>
<td>0.75 ** (2.1)</td>
<td>0.72 (1.6)</td>
<td>1.27 (1.6)</td>
<td>0.87 ** (2.2)</td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.04</td>
<td>0.12</td>
<td>0.32</td>
<td>0.21</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>157</td>
<td>157</td>
<td>157</td>
<td>157</td>
</tr>
<tr>
<td>Number of Mergers per Industry</td>
<td>37</td>
<td>22</td>
<td>9</td>
<td>31</td>
</tr>
</tbody>
</table>

Panel B: Regressing the Fraction of Horizontal Mergers on Trade Liberalization

<table>
<thead>
<tr>
<th></th>
<th>Fraction of Horizontal Mergers 2-Digit</th>
<th>Fraction of Horizontal Mergers 3-Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed Industries</td>
<td>0.07 (0.5)</td>
<td>0.114 (0.3)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>37</td>
<td>68</td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>