Producer Concentration, Conglomerates, Foreign Ownership, and Import Protection: Thai Manufacturing Firms a Decade after the Crisis

Archanun Kohpaiboon
Faculty of Economics, Thammasat University
and
Eric D. Ramstetter, ICSEAD and
Graduate School of Economics, Kyushu University

The International Centre for the Study of East Asian Development, Kitakyushu

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Archanun Kohpaiboon
Assistant Professor, Faculty of Economics, Thammasat University
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Eric D. Ramstetter
International Centre for the Study of East Asian Development
and Graduate School of Economics, Kyushu University

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Abstract

This paper first explains how production concentration, foreign ownership, and exporting have increased in most Thai manufacturing industries during the decade beginning in 1996, just before the economic crisis of 1997-1998. Second, it analyzes the determinants of changes in producer concentration at the industry level, highlighting the weak influence of majority-foreign ownership shares on these changes. It also shows how concentration tended to fall in industries with relatively high import protection, but this correlation was also weak. In contrast, there was a stronger tendency for concentration to rise in industries where shares of intra-industry conglomerates were relatively large in the initial year, although changes in conglomerate shares were not strongly correlated with changes in concentration. Third, incumbent firms, which were also among the largest firms in their respective industries in both years, had a strong tendency to be conglomerate members in both years, and a weak tendency to be majority-foreign owned in 1996, but not 2006. Exporting firms did not have a strong tendency to be among the largest firms, however. Firms that exited or entered samples of the largest firms between 1996 and 2006 did not have a strong tendency to be conglomerate members, majority-foreign owned, or exporters. Thus, potential market power was most common among incumbent conglomerate members and may have existed in some incumbent majority-foreign firms. However, foreign ownership and international trade activities generally had relatively weak effects on concentration and thus on potential market power.

1. Introduction

The high concentration of sellers in a market is a potential cause of market failure which has long been a topic of interest to academics and policy makers alike. Unfortunately, virtually all academic studies of the topic fail to measure seller concentration directly. For example, one ideally wants to calculate net local market sales (total sales + resale of imports – exports) by product for the main industries of a plant- or firm, but such data are often unavailable and Thailand is no exception in this regard. There are three fundamental reasons for the inability to obtain such data, (1) the inability to collect or estimate necessary product-level data on the imports and exports of firms, (2) the fact that many firm- or plant-level data sets necessary for such calculations contain data on production but not on sales, and (3) failure to account for concentration resulting from collaboration among firms or plants belonging to the same ultimate beneficial owner. Although this study cannot resolve the first two problems, it is able to analyze the implications of substantial conglomerate activity within Thai manufacturing industries (Suehiro 2001) for changes in producer concentration. This is an important and challenging task because large changes in corporate ownership and governance structures were some of the most conspicuous results of the 1997/1998 crisis.

Although our measure of producer concentration cannot reflect the role of international trade directly, another major purpose of the paper is to analyze how import protection and foreign ownership affects producer concentration in an industry, after accounting for other factors (barriers) thought to influence concentration. Import protection is often designed to serve the interests of large, local firms, which can often lobby for such protection effectively. If that is the case, high import protection may act as a barrier to competition by protecting large, mainly local incumbents, as was the case in Thai textiles and weaving before 1987 (Kohpaiboon 1995). The automobile industry is another example where protection, which was originally designed to help local interests before the crisis, made MNCs its largest

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beneficiaries after the crisis when many joint ventures became majority-owned by the foreign parent (Doner 1991; World Trade Organization various years; Umemoto and Ramstetter 2004). Conversely, however, it is also possible that high protection could benefit relatively inefficient small producers more than large producers and thus lead to lower concentration, and this appears to have happened in the Thai apparel industry after 1987 (Kohpaiboon 2008).

Economic theory emphasizes how multinational corporations (MNCs) are only found in imperfectly competitive industries (Caves 2007) and it has been feared that entry by large foreign MNCs could lead to the exit of generally smaller, local competitors in developing economies, thereby increasing concentration (Lall 1980; Stiglitz 2002). On the other hand, there is also a substantial literature emphasizing that MNCs can stimulate competition by breaking down entry barriers and/or being a source of technology transfer and/or spillovers to local firms, increasing their ability to compete. Previous studies generally suggest that foreign ownership contributes to increased concentration but there is considerable variation among the results across various samples (e.g., countries, periods, industries) and methodologies.

In the Thai case, Nikomborirak (2005) carefully documents how Thai competition has changed since the 1997/1998 crisis, and correctly emphasizes how import barriers and the activities of foreign MNCs have affected competition in specific industries. Athukorala (2007), Kohpaiboon (2006), and Ramstetter and Sjöholm (2006), among others, also summarize important evidence about other effects of MNCs in Thailand and other Asian economies. However, no known study attempts to model how foreign ownership and/or import protection affected the average level of competition in Thai manufacturing during this key period of Thai economic history, when ownership patterns and corporate governance systems changed markedly in many firms and industries.

This study helps to fill this gap in the literature, beginning with a brief explanation of the empirical methodologies used and the related literature in the following section. It then

reviews trends and patterns observed in producer concentration, foreign ownership, and import protection in 1996-2006 (Section 3). Section 4 presents the results of estimating relationship how intra-industry conglomerates, majority-foreign ownership, and import protection affect producer concentration at the industry level, after accounting for the effects of other entry barriers. Section 5 tries to further illuminate the ownership and export characteristics of alternative groups of the largest firms, such as those that maintained large market shares and had potential market power in 1996 and 2006, those that lost potential market power, and those that gained it during 1996-2006. Section 6 then concludes.

2. Methodology and the Related Literature

This paper uses two distinct methodologies. The first methodology attempts to analyze the industry-level determinants of concentration, highlighting the roles of import protection and foreign ownership. The second then tries to isolate ownership and technical characteristics for alternative samples of firms that are found to relatively large production shares, and thus the potential to exercise market power.

2a. Industry-level Determinants of Concentration

The literature has used two alternatives to model the determinants of producer concentration. One alternative is the dynamic model of producer concentration with incomplete adjustment developed by Levy (1985) and employed in several studies afterwards (e.g. Sleuwaegen and Yamawaki 1988, Battacharya 2002, Ramstetter and Phan 2007). This model assumes that concentration adjusts to its long-run equilibrium level, with the speed of adjustment related to factors affecting entry barriers such as scale economies and market growth. It is also distinguished by a focus on relatively long-term changes in concentration.[1]

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[1] For example, of the six studies summarized in Bhattacharya (2002, p. 2129), two studies

An alternative focuses on modeling the determinants of equilibrium producer concentration in the long run directly (e.g. Resende 2007, Narjoko 2006, Bird 1999, Delorme et al 2002). In this model, producer concentration is estimated a function of entry barriers, industry size, and sometimes international influences (i.e. market orientation, import competition, foreign ownership shares, and trade policy variables). This alternative has the drawback of assuming complete and instantaneous adjustment to unexpected changes in market conditions. However, long-run concentration is determined by the interaction between incumbents and new entrants, and takes time to evolve because the absorption of adjustment costs take time (Lieberman, 1999; Schmalensee 2004). This is especially true in cases where entry involves substantial sunk costs (Schmalensee 2004). In addition, in oligopolistic or monopolistic industries, adjustment may be slowed by the dynamic pricing policies of firms or firm groups with short-run market power (Gaskin, 1971, Kamien and Schwartz, 1971). Hence, we focus on the dynamic model of producer concentration with incomplete adjustment in this study.

Following Levy (1985) and Sleuwagen and Yamawaki (1988), this approach specifies long-term changes in an industry's four-firm concentration ratio (CR4) as a function of two measures of entry barriers (minimum efficient scale for a firm in an industry, the capital requirements of a minimum efficient scale firm in an industry) in the initial year, market growth during the period studied (the growth of industry sales during the period), and the level of concentration in the initial year, which reflects the adjustment toward long-run equilibrium.[2] The entry barrier variables are all expected to be positively correlated with changes in concentration, while the coefficient on the initial level of concentration should be

spanned 14-16 years, two more spanned 10-11 years, and one each spanned 8 and 4 years, respectively.

[2] These studies are also cited in Martin's (2002) standard textbook and included a fifth explanatory variable (the advertising-sales ratio). High research and development expenditures can also act as an important entry barrier (Yang 2007). However, the only estimates of these variables that can be made for Thailand would from the raw data underlying the 1997 industrial census of 1996 data and it is very difficult to match these data with those employed in this study as will be discussed in the following section.

negative as in Sleuwaegen and Yamawaki (1988).[3] Entry barriers are often expected to be higher in slower growing industries, and if this is the case, the market growth variable will be negatively correlated with changes in concentration. On the other hand, it may also be possible for large firms to expand relatively rapidly in anticipation of higher growth, and if this is the case, the correlation will be positive correlation.

To the basic specification, we add four other explanatory variables to examine the influences of conglomerate activity, foreign ownership, and import protection. The first is the share of conglomerate members within each industry. Members of intra-industry conglomerates are in turn defined as firms in which the same ultimate parent has a majority-ownership share. Likewise, the influence of foreign ownership is then examined by adding the share of majority-foreign-owned firms. The third explanatory variable is the effective rate of protection in an interim year and the fourth is the product of the protection variable and the foreign ownership variable.[4]

High import protection can be thought of as another entry barrier, which is often erected by a government to protect relatively large, entrenched firms that have successfully lobbied the government for the protection. To the extent that this is true, import protection probably penalizes small or new firms more than large or older firms, and is likely to be positively correlated with concentration. On the other hand, it is also possible that high protection could

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[3] Studies such as Levy (1985) and Bhattacharya (2002) focus on analyses of the adjustment process and the roles of conventional entry barriers. On the other hand, Sleuwaegen and Yamawaki (1988) and this study use the model to define relevant controls when investigating the relationships between concentration and tariffs or ownership, for example.

[4] As explained in Jongwanich and Kohpaiboon (2007), the effective rate of protection is the focus of political bargaining in Thailand so the effective rate is thought to be a more appropriate measure of protection than the alternative nominal rate of protection in this case. In addition, the *ERP* series used is the average of calculations for importing-competing and export-oriented industries, weighted by the corresponding export-output ratio. Calculations for import-competing industries assume that all tariff rates are binding while calculations for export-oriented industries are based on the assumption that exporters can utilize input tariff exemption schemes.

lead to the proliferation of small firms in an industry and thereby reduce concentration.[5] As with other entry barriers, it probably makes most sense to measure protection at the beginning of the period, but it is only possible to obtain mid-period (2003) estimates in this case. This is not a large problem in the Thai context, however, because the inter-industry distribution of tariffs has not changed much in 1997-2003, though nominal tariff levels did decline some on average (Jongwanich and Kohpaiboon, 2007, World Trade Organization various years).

As emphasized by Caves' (2007, ch. 4) review of the literature, economic theory suggests that MNCs will only exist in imperfectly competitive markets and previous results indicate that MNC presence is often positively correlated with producer concentration. However, much of this literature is rather old and focused on developed economies.[6] On the other hand, partially because MNCs are relatively large and have relatively easy access to resources and markets, they can sometimes overcome entry barriers and increase competition previously dominated by large local firms. Entry by a particular MNC may also encourage entry by other competitors (MNCs or even local firms) who think they must compete with the entering MNC's move. In Thailand and many other developing economies, MNCs are also though to be important sources of technology transfer and spillovers.[7] If this is the case, MNC presence

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[5] Indeed, protection can be designed for the very purpose of promoting smaller firms but governments don't usually design trade protection schemes to do this and Thai import policy seems to be no exception in this respect. On the other hand, Jongwanich and Kohpaiboon (2007) found a positive relationship between protection (either NRP or ERP) and producer concentration in Thai manufacturing, suggesting that protection benefits relatively concentrated industries more than others.

[6] For generally older studies of developed economies, see for example, Rosenbluth (1970) Gorecki (1976) and Shapiro (1983) for Canada; Knickerbocker (1976), Levy (1985), Geroski et al. (1987); Dunning (1974), Hart & Clarke (1980) and Fishwick (1982) for Britain; Jenny and Weber (1978) for France; and Dixon (1987) for Australia. For developing economies, older studies cover Malaysia (Lall 1980; Kalirajan 1993), Mexico (Newfarmer and Mueller 1975; Connor 1977, Blömstrom 1986), Chile (de Melo and Urata 1986), Taiwan (Chou 1986), Brazil (Mooney et al. 1980; Willmore 1989), and Guatemala (Willmore 1976), while some more recent studies examine Indonesia (Bird 1999), Malaysia (Bhattacharya 2002), Taiwan (Yang 2007), and Vietnam (Ramstetter and Phan 2007).

[7] See, for example, Athukorala (2007), Khantachai et al. (1987), Kohpaiboon (2006), Ramstetter and Sjöholm (2006), and Santikarn (1981).

is also likely to have important dynamic impacts on producer concentration as cost structures of firms change in response to the transfers and spillovers, though the nature of these dynamic effects on producer concentration (whether they benefit incumbent large firms more than others or not) is not clear. Previous studies also suggest that productivity spillover effects of foreign ownership are related to the level of protection (Kohpaiboon 2006, ch. 6) so it may be important to account for such interactions between foreign ownership and import protection effects when analyzing producer concentration.

Thai conglomerates, some which have numerous firms in one industry, constitute another ownership group of interest here and all members of such intra-industry conglomerates are consolidated and treated as a single observation in our data set. Many MNC groups also constitute intra-industry conglomerates in several industries. If conglomerates account for a relatively large share of production in an industry it seems most likely that overall concentration will also tend to be relatively high in that industry because conglomerate groups are likely to be relatively large. However, there are also a large number of industries with no conglomerate presence so the strength of this correlation is not clear *a priori*.

The exact nature of the relationship between these two ownership variables and changes in concentration are not known so two different possible relationships are examined. The first is the relationship between ownership shares at the beginning of the period and changes in concentration (equation (1)), and the second is the relationship between changes in ownership and changes in concentration (equation (2)). These relationships can be expressed as follows:

(1) $\quad CR4_{96\text{-}06,i} = {}_{0} + {}_{1}AKC_{96,i} + {}_{2}MES_{96,i} + {}_{3}GMS_{96\text{-}06,i} + {}_{4}CON_{96,i}$
$\qquad\qquad\qquad + {}_{5}FOR_{96,i} + {}_{6}ERP_{03,i} + {}_{7}FOR_{96,i}*ERP_{03,i} + {}_{8}CR4_{96,i}$

(2) $\quad CR4_{96\text{-}06,i} = {}_{0} + {}_{1}AKC_{96,i} + {}_{2}MES_{96,i} + {}_{3}GMS_{96\text{-}06,i} + {}_{4}\;CON_{96\text{-}06,i}$
$\qquad\qquad\qquad + {}_{5}\;FOR_{96\text{-}06,i} + {}_{6}ERP_{03,i} + {}_{7}\;FOR_{96\text{-}06,i}*ERP_{03,i} + {}_{8}CR4_{96,i}$

where
$CR4_{96,i}$ = 4-firm concentration ratio in industry i in 1996;
$\quad CR4_{96\text{-}06,i}$ = change in *CR4* between 1996 and 2006 (percentage points);
$AKC_{96,i}$ = absolute minimum capital requirements of industry i; estimated as the average value of fixed assets for firms accounting for 50 percent of the industry's output (billion baht);

$MES_{96,i}$ = minimum efficient scale; estimated as the average sales of firms accounting for 50 percent of the industry's output (billion baht);

$GMS_{96,i}$ = growth of sales for industry i (percent);

$CON_{96,i}$ = share of firms belonging to intra-industry conglomerates in the sales of industry i in 1996 (percent);

$CON_{96-06,i}$ = change in CON between 1996 and 2006 for industry i (percentage points);

$FOR_{96,i}$ = share of majority-foreign firms in the sales of industry i in 1996 (percent);

$FOR_{96-06,i}$ = change in FOR between 1996 and 2006 for industry i (percentage points);

$ERP_{03,i}$ = effective rate of protection in industry i in 2003 (percent);

2b. Ownership and Export Characteristics of the Largest Firms

After examining how protection and foreign ownership affect concentration, the firm-level variation in the data set is then used ask if the largest firms in each industry tended to be conglomerates, foreign, and/or exporters, after accounting for firm-level variation in the average capital productivity relative to the industry mean and industry-level variation in producer concentration, as described by the following equation:

(3) $S_{ijt} = \gamma_0 + \gamma_1 DC_{ijt} + \gamma_2 DF_{ijt} + \gamma_3 DX_{ijt} + \gamma_4 SK_{ijt} + \gamma_5 CR4_{jt} + \gamma_6 D2_{ijt}$

where

S_{ijt} = firm j's share industry i's sales in year t (percent);

DC_{ijt} = a dummy variable equal to 1 if firm j in industry i belongs to a conglomerate with more than one firm in industry i for year t; equal to 0 for all other firms;

DF_{ijt} = a dummy variable equal to 1 if firm j in industry i is majority-foreign owned (50-100%) in year t; equal to 0 for all other firms;

DX_{ijt} = a dummy variable equal to 1 if firm j in industry i is an exporter in year t; equal to 0 for all other firms;

SK_{ijt} = the sales-fixed assets ratio of firm j in industry i in year t divided by the mean sales-fixed assets ratio for industry i in year t (ratio);

$CR4_{it}$ = 4-firm concentration ratio in industry i in year t;

$D2_{ijt}$ = a dummy variable equal to 1 if the observation is for 2006; equal to 0 for all other observations (only relevant in samples containing observations from 2 years).

This specification is clearly *ad hoc* because it omits other important variables thought to determine the variation of firms' shares of their industry or market sales.[8] Econometric results will thus be biased to some extent.

However, estimates of equation (3) are still thought to be useful for investigating the nature

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[8] These variables include other measures of firm productivity and proxies for the extent to which non-price competition is used (i.e. advertising expenditure; Mixon and Hsing, 1997).

and the strength of relationships between ownership and export characteristics on the one hand, and market shares of the largest firms, on the other. For example, if γ_2 is positive, it would suggest that majority-foreign MNCs tend to have relatively large market shares than the control group (firms that are not conglomerate members or exporters), even after accounting for firm-level variation in capital productivity and industry-level variation in producer concentration. Then if γ_2 is also statistically significant, it would suggest that the correlation between foreign ownership and market share is relatively strong in the sample examined. Interpretations of γ_1 and γ_3 are similar with regard to relationships between conglomerate membership or export status, on the one hand, and market share on the other.

3. Trends and Patterns of Concentration, Foreign Ownership, and Import Protection

Before proceeding, it should be reemphasized that this paper investigates a tumultuous period in Thai economic history, the decade beginning just before the 1997-1998 economic crisis. During this period, the economy went through important adjustments that included the strengthening of corporate oversight and important changes in many large (primarily local) firms that took on large debts before the crisis. Second, there was a large increase in foreign direct investment (FDI) during and immediately following the crisis.[9] A large portion of this FDI was used to finance buyouts of Thai partners in joint ventures and foreign ownership shares rose in many of these joint ventures.[10] A number of new, majority- or wholly-foreign MNCs were established and several MNC groups also reorganized themselves substantially. Third, Thailand greatly reduced average import protection before the crisis with the average

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[9] For example, according to Bank of Thailand (2008), inward FDI rose more than three-fold from an average of US$2.2 billion per year in 1995-1996 to an average of US$6.8 billion in 1998-1999. Flows then declined to an average of US$4.6 billion in 2000-2004, before reaching new highs of US$8.0 billion in 2005 and US$9.0 billion in 2006.

[10] Note that increases in FDI stocks (positive FDI flows) can be used to finance (1) increases in fixed assets, (2) other (mainly financial) assets, or (3) decreases in non-FDI sources of equity or liabilities in MNC affiliates.

applied tariff falling from 44 percent in 1991 to 23 percent in 1995 (World Trade Organization various years). Tariffs continued to fall after the crisis to 17 percent in 1999 and 15 percent in 2002-2003, partially in order to fulfill previous commitments to the World Trade Organization (WTO) and the ASEAN (Association of Southeast Asian Nations) Free Trade Agreement (AFTA).

Estimating industry-level variables like the four-firm concentration ratio and related indicators is difficult in the Thai case. The only known official time series on industry output (revenue) comes from national accounts' estimates made by the National Economic and Social Development Board (NESDB) and the only known comprehensive industrial census is for 1996 from the National Statistics Office (NSO). Unfortunately, however, estimates of industry output from these two sources differ greatly for a number of industries in 1996.[11] A second problem is that we need to identify large firms or plants in each industry but this is impossible from official sources for 2006 and only possible for plants in the industrial census for 1996. In order to circumvent this constraint, we use data on large corporations from Business On-Line (2008), supplemented by a large number of related sources, to estimate sales of the largest firms in each industry. This firm-level compilation is of course very different than corresponding compilations from the industrial census and the national accounts.[12]

Because the data for the largest firms and industry output are not compiled consistently, it is impossible to consistently calculate four-firm concentration ratios that cover all of Thai manufacturing in both 1996 and 2006. Table 1 provides two alternative estimates of *CR4* that

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[11] The NSO also provides estimates extrapolated from sample surveys for 1998, 1999, 2000, and 2002 (National Statistics Office 2001, various years) but these estimates also differ greatly from corresponding NESDB estimates in many industries.

[12] The existence of multi-plant firms can create large differences between firm-level compilations and plant-level compilations such as in the industrial census. The methodology for constructing national accounts estimates also differs from either firm- or plant-level compilations.

can be calculated for both years. The first estimate is for large firms only, and is calculated as the share of the largest 4 firms in the sales of all large firms in our database.[13] This measure is the most consistently defined for both years and is thus the best indicator we have for analyzing changes in concentration over time. However, this large-firm estimate also greatly overestimates the level of concentration in industries dominated by small firms relative to those dominated by large firms. Hence the alternative NESDB-adjusted estimates are calculated as the ratio of the revenue of the 4 largest firms to total market revenues, which are estimated as the larger of total revenues of all firms in our large-firm database or economy-wide estimates from National Economic and Social Development Board (2008). The adjusted figures are not precise measure of overall concentration because of differences in NESDB compilations and the large compilations here, but they are probably the best available estimates of overall concentration available at this point in time.[14]

The large firm estimates first reveal a mild trend toward increased concentration over the decade. The mean 4-firm concentration ratio for the 58 industries in Table 1 increased from 61 to 65 percent and *CR4* increased in 39 industries but declined in only 17, and was unchanged in 2. Relatively large increases of 15 percentage points or more were observed in 10 industries: 4 in food products (meat, fish, fruit & vegetables, other food) plus footwear, paper, and non-metallic mineral products, radio & TV transmitters, optical & photographic machinery, and jewelry. On the other hand, similarly large declines were observed in only two industries, wood sawmilling and synthetic fibers. Likewise the number of industries

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[13] In principle, the sample of large firms consisted of the largest 15 firms in each industry as identified by Business On-Line (2008). However, cross checks of alternative sources revealed several hundred firms larger than the cutoffs implied by Business On-Line and these firms were thus added to the sample. On the other hand, a few firms included in the Business On-Line sample were clearly not engaged in manufacturing and omitted from the sample. Moreover, if two or more majority-owned firms belonging to same corporate group were included in an industry, data for these firms were combined and the combined entity was treated as a single firm. See Appendix A for more details.

[14] A third alternative using NSO estimates of total industry output can also be calculated for 1996 (See Appendix Table 1).

experiencing moderate increases in *CR4* of between 10 and 15 percent (8) was slightly larger than the number of industries experiencing declines of similar magnitude (5). However, the largest group of industries (21) experienced relatively small increases of between 0 and 10 percentage points and another substantial group (10 industries) had similarly small decreases.

Not surprisingly, NESDB-based estimates suggest lower values for *CR4* in many industries (Table 1). There are also relatively large differences in estimates of *CR4* changes in several industries. For example, NESDB-based estimates differed from large-firm estimates by 10 percentage points or more in absolute value in about one-third of the 58 industries (11 positive and 9 negative differentials). The NESDB-adjusted estimates also suggest relatively large changes in concentration amounting to 15 percentage points or more in absolute value were more common than the large-firm estimates indicate (14 versus 10 increases and 4 versus 2 decreases). However, the patterns observed in NESDB-adjusted estimates of changes in *CR4* were also similar to those in corresponding large-firm estimates in important respects. First, the rise in mean four-firm concentration ratio for the 58 industries was of similar magnitude (5 versus 4 percentage points). Second, approximately the same number of industries experienced positive (40 versus 39) or negative (16 versus 17) changes in *CR4*. Third, roughly the same number of industries experienced relatively small changes of 10 percentage points or less in absolute value (32 versus 33). As a result, simple correlations between large-firm estimates and the NESDB-adjusted estimates were rather high (0.67 for 1996, 0.61 for 2006, and 0.51 for changes between the two years).

Because we are particularly interesting in the ownership and exporting characteristics of the firms in out sample, Table 2 calculates the shares of intra-industry conglomerate members (defined as firms operating in the same industry that are majority-controlled by the same ultimate parent), all foreign firms (defined as firms with 10 percent or more of their ownership controlled by a single foreign firm or group) majority-foreign firms (firms with

foreign ownership shares of 50 percent or more) and exporting firms. Of these groups, intra-industry conglomerate members were the smallest, accounting for 22 percent of all large firm revenues in 1996 and 19 percent in 2006. Conglomerate members were present in 32 of the 58 industries in both years and had moderate shares equal to or exceeding 15 percent of the sales in 24 (1996) or 25 (2006) industries. Conglomerate members had particularly large shares of 50 percent or more in five industries in both years (meat products, starched & animal feeds, paper, non-metallic mineral products, and other transportation machinery), one industry in 1996 only (motor vehicle bodies & trailers), and three in 2006 only (dairy products, glass products, and miscellaneous manufacturing). It is not surprising that some of Thailand's most prominent groups have multiple firms in these industries.[15] However, conglomerate shares were much smaller in most industries, under 30 percent in 44 industries in 1996 and 51 industries in 2006.

Foreign MNCs accounted for a relatively large portion of large-firm sales in both years, 58 percent in 1996 and 69 percent in 2006 (Table 2). If ratios of sales by large MNCs to NESDB estimates of total manufacturing output are calculated, they suggest an even bigger rise in the share of large MNCs from 35 percent in 1996 to 54 percent in 2006.[16] A large, albeit declining, portion of the MNCs are minority-owned joint-ventures, often undertaken with affiliates of Thai conglomerates among other local partners. If such minority-foreign ventures are excluded, the majority-foreign share was only 34 percent in 1996, although this share rose much more rapidly than the total foreign share to 52 percent 2006. Two important causes of

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[15] For example, Siam Cement, Thailand's largest conglomerate was dominant in paper and non-metallic mineral products in both years. The Charoen Pokphand Group and the Betagro Groups are two other well-known Thai conglomerates with several firms each in meat products and animal feeds. On the other hand, firms belonging to foreign MNC groups were important in several other industries (e.g., Nestle in dairy products in 2006, Mitsubishi Motors and Nissan in motor vehicle assembly in 1996, Honda in other transportation machinery [motorcycles] in both years, and Unilever in miscellaneous manufacturing in 2006).
[16] The 35 percent figure is similar to other comprehensive estimates for 1996 (Ramstetter and Sjöholm, 2006, pp. 119-120).

the increase majority-foreign ownership were (1) the loosening of Thai ownership restrictions after the 1996-1997 crisis and (2) the financial difficulties incurred by local joint venture partners during and after the crisis, which sometimes required the foreign parent either to raise its equity share or see the joint venture go bankrupt. We focus on the majority-foreign share in this paper because control is an important element of foreign ownership's meaning in the context of equations (1) and (2).

The trend toward increased shares of majority-foreign MNCs is also observed at the industry level. For example, in 1996 majority-foreign shares were 50 percent or more in 15 of the 58 industries (Table 2). 11 of these 15 industries were among the 20 machinery industries listed from general purpose machinery to other transportation machinery in Table 2. By 2006, the number of industries in which majority-foreign MNCs accounted for half or more of total revenue more than doubled to 29. In 2006, majority-foreign shares were 50 percent or more in all 20 machinery industries, reflecting the advantages that multi-plant, geographically disbursed production often has in these industries.

Exporters were the largest group examined in Table 2, and they also increased their share of large-firm sales from 63 to 74 percent in 1996-2006. Moreover, the number of industries in which exporters accounted for 70 percent or more of industry sales rose from 27 to 36 during this period. The group of 20 machinery industries accounted for just under half of the industries (13 in 1996, 14 in 2006) in which exporter shares exceeded the 70 percent threshold. Exporters also exceeded this threshold in traditional export industries such as meat products, fish products, starches & animal feeds, textiles, spinning, & weaving, knitted fabrics, apparel, footwear, other wood products, and other rubber products, as well as in couple of other industries (synthetic fibers, and non-metallic mineral products).

As might be expected all manufacturing conglomerate members combined to account for a somewhat larger portion of sales by *CR4* firms than of total large firm sales (an average of 12

percentage points higher in 1996 and 8 points higher in 2006; Tables 2, 3). This tendency is also observed in the 32 industries in which conglomerate members had positive sales. For example, conglomerate shares of *CR4* firm sales were larger than corresponding shares of all large firm sales by 10 percentage points or more in over two-thirds of these industries (21 in each year). Smaller positive differentials between shares of *CR4* firms and shares of all large firms were also common (8 industries in 1996 and 10 in 2006), but negative differentials were rare (only 3 industries in 1996 and 1 in 2006). In other words, these data suggest a strong tendency for conglomerate members to account for disproportionately large shares of sales by *CR4* firms.

All MNCs, majority-foreign MNCs, and exporters also tended to account for disproportionately large shares of *CR4* firms, but differences in these two sets of shares were relatively small and inconsistent across industries (Tables 2, 3). For example, if all manufacturing firms are combined, both MNC shares of *CR4* firms were both slightly larger than shares of all large firms in 1996 (by 2-3 percentage points each) but identical or slightly smaller in 2006 (0 to -1 percentage points). Exporter shares were slightly larger in both years (1 and 4 percentage points, respectively; Tables 2, 3). For majority-foreign MNCs, shares of *CR4* firms were larger than shares of all large firms in 25 industries in 1996 and this number increased to 32 in 2006. Relatively large differentials between majority-foreign shares of *CR4* firms and corresponding shares of all large firms that amounted to 10 percentage points or more in absolute value were observed in somewhat over a fifth of the industries. In 1996, these differentials were evenly split between positive and negative (8 vs. 6) but became mainly positive in 2006 (13 vs. 3). Among exporters, positive differentials were somewhat more common at the industry level (42 vs. 16 in 1996 and 44 vs. 11 in 2006), but relatively large positive differentials (10 percentage points or more) were not that common in this case either (17 industries in 1996, 15 in 2006). In other words, the evidence summarized here

suggests that conglomerate members, followed by exporters, and majority-foreign MNCs all tended to account for disproportionately large shares of sales by *CR4* firm sales and that this characteristic was most conspicuous for conglomerate members followed by exporters, and least conspicuous for majority-foreign MNCs, especially in 1996.

Finally, it should be noted that Thailand's effective rates of protection continue to vary widely among manufacturing industries, ranging from -26 percent to 47 percent, despite the overall trend toward reduced protection noted above (Table 1). Six industries (other food products, beverages, apparel, rubber tyres & tubes, other transportation machinery, and miscellaneous manufacturing) had the highest tariff rates of 30 percent or more and another 10 industries had moderate rates of 15 to 29 percent. Most (27) industries had relatively low positive rates of 0-15 percent and another 9 industries had small negative rates between 0 and -5 percent.[17] Effective rates were -5 percent or less in another six industries (meat products, fish products, starches and animal feeds, leather tanning & dressing, synthetic fibers, and batteries, etc.).

4. Relationships among Concentration, Foreign Ownership, and Import Protection

The difficulties of estimating industry-level revenue or output, and corresponding difficulties in constructing estimates of the four-firm concentration ratio described in the previous section, also have important implications for estimates of Equations (1) and (2). Namely, the large discrepancies between alternative estimates of industry output or revenue (NESDB, NSO, or large firms) suggest that estimates that combining data from these sources would create measurement errors related to mismatches among the industry classifications used in each source. In this respect, estimates that rely primarily on the large-firm database

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[17] Negative effective rates of protection can result when the variation in tariffs across intermediate goods affects alternative industries differently. For example, the unusually low level rate of effective protection in leather, tanning & dressing results largely from high tariffs on the imports of live animals, but these tariffs have weaker effects on other industries.

are attractive because they can avoid most classifcation mismatches and these estimates are the focus of the analysis.[18] On the other hand, calculations from the large-firm database clearly overestimate concentration in industries where small firms are relatively important and are also likely to overestimate barriers like average capital requirements and minimum efficient scale in such industries. Therefore, the sensitivity of the results to the choice of data set was also investigated by estimating equation (1) using calculations from the NSO/NESDB-adjusted database, although it is impossible to calculate shares of intra-industry conglomerates from this source. The major results from these alternative estimates do not differ much and are reported in Appendix Tables 4 and 5.[19] Sampling is also an important issue because calculations of Cook's Distance suggest that three industries (synthetic fibers, optical & photographic machinery, and jewelry) were outliers, and their exclusion has important implications for the results.[20] Results including and excluding these industries are thus examined.

Estimation results reveal three important patterns (Tables 4, 5). First, the adjustment coefficients on the initial *CR4* level were negative and highly significant statistically, at the 1 percent level in all equations. However, coefficients on the standard entry barriers (initial values of *AKC* and *MES*) and market growth (*GMS*) are never significant standard 5 percent

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[18] There are still important mismatches between the commodity classifications used to calculate protection estimates and the other variables in all models estimated, but if calculations are made exclusively from the large-firm database, classifications of concentration, average capital requirements, minimum efficient scale, and the growth of industry revenues become consistent.

[19] This database uses the NESDB-adjusted measure of *CR4* (Table 1) and estimates of *GMS* from the NESDB data set while *AKC*, *MES*, and *FOR* are calculated from factory-level data underlying NSO's industrial census for 1996 (Appendix Table 7). Additional estimates using the nominal rate of protection instead of *ERP* were also tried but performed rather poorly as expected and are not reported here. They are available from the authors on request, however. Note also that alternative estimates of equation (2) are not possible because 2006 values of *FOR* are not available from these calculations.

[20] The lack of NESDB estimates for 4 of the 58 industries in the large-firm samples means that the construction of comparable samples is complicated when comparing results from the large-firm database with those from the NSO/NESDB-adjusted database.

level or better if all industries are included in the regression samples. In other words, there was a strong tendency for industries with relatively high concentration in 1996 to experience declines in concentration during the subsequent decade and this relationship alone explains a substantial portion of the variation in concentration levels. If the three outlier industries are dropped, however, the coefficient on the initial value of absolute minimum capital requirements becomes significant at the standard level. Elimination of outliers also increased R-squared values in all variations of equation (1) and in 3 of 4 variations for equation (2). R-squared values also rose markedly to reasonable levels (0.39-0.41) for cross sections such as these when variations of equation (1) were estimated, but changed less and remained much lower (0.24-0.31) in variations of equation (2). Thus, the adjustment process described by these models is generally consistent with the patterns observed among large firms during 1996-2006. On the other hand, standard measures of market barriers and market growth explain very little if any of the variation in concentration changes between 1996 and 2006.[21]

Second, coefficients on majority-foreign ownership (*FOR*), its change (*FOR*), import protection (*ERP*), or the interaction of foreign ownership and import protection variables are never significant at the standard level (Tables 4, 5). Estimates of equation (1), which relate changes in concentration to initial levels of conglomerate and foreign ownership, generally explained the variation in concentration changes better than those of equation (2), which relate concentration changes to changes in conglomerate and foreign ownership but the two sets of results are similar with respect to the foreign ownership and protection variables.

Namely, coefficients on the foreign ownership variables are positive, but never even weakly significant at the 10 percent level (Tables 4, 5). This suggests that foreign ownership may have been positively correlated with changes in concentration during this period, but that

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[21] The explanatory power of estimates for six European countries by Sleuwaegan and Yamawaki (1988) was generally somewhat higher than for equation (1) here but fell in a similar range for many of the countries and specifications considered and was lower for others.

the correlation is very weak and probably means little. When outliers are included in estimates of equation (2), the coefficient on the interaction foreign ownership and import protection is negative and weakly significant at the 10 percent level, suggesting that the combination of protection and foreign ownership may have led to lower concentration, but this correlation is much weaker in estimates of equation (1). If outliers and the interaction term are dropped, the coefficient on the protection variable becomes weakly significant whether the foreign ownership variable is included or not (equations (1a), (1b), (2a), (2b)). Because the models generally perform better without the outliers, it seems likely that protection variable has more explanatory power than the interaction term in these samples.

Third, the coefficient on the share of intra-industry conglomerate members was always positive and highly significant at the 2 percent level or better in almost all variations of equations (1) and (2) in Tables 4 and 5. In other words, although foreign ownership and protection were only weakly correlated changes in concentration, there was a strong tendency for industries in which conglomerates had relatively large shares in 1996 to experience relatively large increases in concentration during the following decade. For example, of the 10 industries that increased relatively large increases in concentration of 15 percentage points or more, 3 industries had conspicuously large conglomerate shares in 1996, meat products (52 percent), paper products (52 percent), and non-metallic minerals (74 percent) in 1996 (Tables 1, 2). These industries are dominated by some of Thailand more prominent business groups such as the Betagro Group, the Chaoreon Pokphand Foods (CPF) Group, and the Saha Farms Group in meat products and the Siam Cement Group (SCG) in the other two industries. In 1996, conglomerate shares were also substantial in another 3 of these industries, fish products (23 percent), footwear (31 percent), and synthetic fibers (34 percent), but the remaining 4 industries which experienced large increases concentration had small or zero conglomerate presence.

Partially because we wanted to examine the sensitivity of the coefficients on foreign ownership and import protection, and partially because we wanted to try estimates using the NSO/NESDB data set for another sensitivity test, we tried estimating the variations of equations (1) and (2) omitting the conglomerate share and the results are reported in Appendix Tables 4 and 5. These estimates do reveal a couple alternative cases in which the foreign investment and protection variables become significant. The biggest difference is that estimates of equation (1) without the conglomerate variable (equation (1d) in Appendix Table 4) and using the large-firm data set suggest that the protection has a negative and significant impact on changes in concentration, while the interaction of protection and majority foreign shares have the opposite effect. In other words, these results provide additional evidence that industries with high effective protection experienced falling concentration, but that this effect was at least partially offset in industries where both protection and majority ownership were high. However, this evidence only obtains if the potentially important role of conglomerates is ignored, even though the correlations among the conglomerate shares, majority-foreign shares, and effective protection are relatively low.[22] If the NSO/NESDB data set is used, the results indicate that majority-foreign ownership had a positive effect that was weakly significant if outliers were included but not if they were excluded.

In short, dropping the conglomerate variable and using the NSO/NESDB data does have an effect on the results regarding effective protection and its interaction with foreign ownership shares. However, even if the conglomerate variable is dropped, correlations between changes in concentration and foreign ownership shares remain insignificant or weak in most specifications. More importantly, however, we believe that inclusion of the conglomerate variable is appropriate in this case, both for theoretical and statistical reasons. Thus, we rely primarily on the results presented in Tables 5 and 6, concluding that changes in concentration

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[22] Simple correlation coefficients between $CON_{96,i}$ and the foreign ownership and protection variables were $FOR_{96,i} = -0.05$, $ERP_{03,i} = -0.06$, $FOR_{96,i}*ERP_{03,i} = 0.22$.

were strongly and positively correlated with initial conglomerate shares, while correlations between changes in concentration on the one hand, and initial foreign ownership shares, changes in foreign ownership, or effective protection on the other hand, were much weaker.

5. Ownership and Exporting Characteristics of the Largest Firms

What are the ownership and export characteristics of the largest firms? Tables 2 and 3 give some hint to this question's answer and this section provides further evidence by estimating equation (3) in several subsamples for three groups of large firms. The first group consists of a relatively small number (84 in 1996 and 91 in 2006) of the largest firms which have market shares (S_{ijt}) of 15 percent or more. Results for this group are the focus of the analysis because this threshold provides the most plausible distinction between firms that are large enough to potentially exercise market power and smaller firms, which generally have no market power to exercise. However, results for two other groups are also presented to illustrate the sensitivity of the results to the use of alternative size thresholds. The alternatives include an intermediate-sized group of firms that have market shares of 10 percent or more (144 in 1996 and 165 in 2006) and a larger group of all *CR4* firms (232 in 1996 and 231 in 2006).[23] However, a substantial portion of the *CR4*-group firms had market shares under 10 percent (88 in 1996 and 66 in 2006), and were probably too small to be able exercise market power on their own. These groups are then further divided into a subgroups meeting respective sample criteria in both years (incumbents) and a subgroup meeting the criteria in only one year (exiting firms or new entrants).

Focusing first on the most meaningful group of the largest firms which have market shares of 15 percent or more, the results reveal four basic patterns. First, results for the subgroup of incumbent firms exceeding this size threshold in both years (Table 6, block 1) differ greatly

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[23] All firms with market shares of 15 percent or more are also *CR4* firms in this dataset but there are two firms with market shares exceeding 10 percent which are not *CR4* firms.

from results for the subgroup of exiting firms or new entrants that exceeded the size threshold in only one of the two years. Correspondingly, it is probably inappropriate to pool these subgroups and that is why Table 6 only presents results for the separate subgroups. Second, results for each group also differ markedly between the 1996 and 2006 and thus Table 6 only presents for years separately, because it is also likely to be inappropriate to pool observations for these two years.[24] Third, coefficients on the control for industry-level concentration are positive as would be expected. These coefficients are also highly significant in both incumbent samples and in the 2006 sample of new entrants, but not in the 1996 sample of exiting firms. Fourth, average capital productivity is positively related to market shares in both years for incumbents and 2006 for new entrants, but is only statistically significant for the new entrants. For exiting firms, in 1996 this coefficient was unexpectedly negative but statistically insignificant. In other words, capital productivity was a significant determinant of market share for new entrants in 2006, but not for firms exiting the group between 1996 and 2006, or for incumbent firms.

In the samples of the largest firms with market shares of 15 percent or more, coefficients on the dummies for MNCs and exporters were positive for incumbents and new entrants but negative for exiting firms (Table 6). The positive coefficients suggest that MNCs and exporters usually had larger market shares than the control group (firms that are not MNCs, exporters, or members of intra-industry conglomerates) among incumbents and new entrants, and smaller market shares among exiting firms. However, the relatively small size of these coefficients (a maximum of 4.6 percentage points for incumbent MNCs in 2006) and their lack of statistical significance suggest that differences in market shares between MNCs or exporters on the one hand, and the control group on the other, were not large and/or consistent.

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[24] Regressions combining the two groups and/or the two years are available from the authors but are not thought to be very meaningful as described in the text.

In some contrast, coefficients on the dummy for incumbent conglomerate members were positive, relatively large (6.7 in 1996 and 5.1 in 2006), significant at the standard 5 percent level in 1996, and weakly significant at the 8 percent level in 2006 (Table 6). There is thus some indication that among incumbent firms, market shares were on average 5-7 percentage points higher than in the control group, after controlling for industry-level variation in concentration and firm-level variation in average capital productivity, and that these positive differentials were relatively large and/or consistent. On the other hand, among exiting firms in 1996 and new entrants in 2006, conglomerate members had on average relatively small market shares, though differences between conglomerate members and the control group were not significant in these groups of firms.

In short, the above results suggest relatively few strong correlations between ownership and export characteristics of the largest firms on the one hand, and their market shares on the other. Reestimating equation (3) for firms with markets shares of 10 percent or more, or for the group of all *CR4* firms (Table 6) suggests that incumbent MNCs had significantly larger market shares than the control group in 1996 (but not 2006). Results from the group of firms with market shares of 10 percent or more also indicates that differences between incumbent conglomerate members and the incumbent control group are not weakly significant at the 10 percent level or better. In the sample of all incumbent *CR4* firms, differences between incumbent conglomerate members are similar to the results for the sample of firms with market shares of 15 percent or more (positive and significant in 1996 or weakly significant in 2006). There is also a weak indication that exporters had relatively high market shares among all *CR4* firms in 2006. However, regardless of the samples used, these data do not suggest a particularly strong relationship between ownership or export status on the one hand, and the market shares of Thailand's largest manufacturers on the other, the major exception being for incumbent conglomerate members.

6. Conclusion

This paper first explained how foreign ownership, conglomerate activity, and protection are likely to be related to changes in producer concentration and a simple methodology for examining these relationships after accounting for the effects of other entry barriers likely to be relevant. It then described how producer concentration tended to increase during 1996-2006 in 58 manufacturing industries, which were defined at a rather aggregate level in order to minimize measurement errors related to the existence of multi-product firms. The descriptive analysis also highlighted how majority-foreign ownership tended to increase during this period while shares of conglomerates declined slightly overall. The effective rate of protection also varied greatly across industries.

Changes in producer concentration were then related to initial values of ownership shares of intra-industry conglomerates or majority-foreign firms or their changes in 1996-2006, and the effective rate of protection in 2003. Regressions that also controlled for the influence of standard entry barriers and the tendency for concentration to fall in relatively concentrated industries, revealed a fairly strong correlation between initial conglomerate shares and changes in concentration during the subsequent period. There was some weak evidence that concentration tended to fall more in highly protected industries than in others. However, the results did not reveal strong relationships among changes in concentration and foreign ownership, and the evidence regarding the influence of protection was quite weak as well.

Firm-level variation was then related to ownership and exporting status after accounting for firm-level variation in average capital productivity and industry-level variation in producer concentration. Among incumbent firms that existed in alternative samples of the largest firms in both 1996 and 2006, there was a weak tendency for the largest firms to be conglomerate members in both years and to be majority-foreign owned in 1996 but not 2006, though

correlations with export status were weaker. Among exiting or entering firms that existed among the samples of the largest firms in only one of the two years, there were no strong correlations with ownership or export status, however.

These results thus suggest that conglomerate membership had a relatively strong positive effect on concentration changes during this period and that the largest incumbent firms were likely to be conglomerate members. Correspondingly, it seems most likely that intra-industry conglomerate members have the greatest potential to exercise market power of the groups examined here and anti-trust authorities are probably wise to scrutinize the competitive behavior of conglomerates carefully, especially in concentrated industries. Moreover, theory alone would suggest that anti-trust authorities are also probably wise to observe the behavior of foreign MNCs closely, because they are likely to be large operators in imperfectly competitive markets. On the other hand, foreign MNCs appear to have exerted little influence on concentration during 1996-2006 in Thai manufacturing, and did not have a strong tendency to be among the largest firms in 2006, despite large increases in majority-foreign shares and a tendency to be among the largest firms in 1996. Finally, changes concentration may be higher in industries where import protection is low and anti-trust authorities may thus want examine concentrated industries with low protection more than others as well. However, in concluding, it must be reemphasized that analyses such as these can only identify firms and industries in which concentration creates potential market power, and that the existence of potential market power does not necessarily imply it use.

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Appendix: Firm-level Database Description

This appendix describes the firm-level data used for this study and how it was processed. The primary data come from Business On-Line (2008), which provided us with data on the 15 largest firms (or all firms in cases where the total number was less than 15) in each of 66 manufacturing industries (Appendix Tables 1-3). This level of aggregation is rather high for studies such as these, which often distinguish hundreds of industries. On the other hand, the classification of firms, many of which produce several products, into a single industry is often very problematic even at this rather high level of aggregation and use of a more detailed classification is not thought to be practical with these firm-level data.

The primary data were then cross checked with data from numerous secondary sources, notably Advanced Research Co., Ltd (1998, various years), Alpha Info Co. Ltd. (1997), Board of Investment (1999), Dun & Bradstreet and Business On-Line (1999), Nation (various years), Stock Exchange of Thailand (various years a, various years b), and Toyo Keizai (various years). Home pages for most of the individual companies covered in this study and a few additional sources were also consulted when information from the previously mentioned sources was insufficient.[25] The secondary sources facilitated the identification of 328 additional firms that exceeded the size threshold established by Business On-Line (2008) but

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[25] The additional sources include Board of Investment (1999), Brooker Group (1996, 1997), Business Research and Development (various years), Business Research and Development (various years), and Kompass (various years),

were excluded from that primary dataset. These firms were then added to the dataset, with most of the additions (283) being for 1996. There was thus some concern that the supplemented data set would be more representative of 1996 than 2006, but the resulting samples of large firms accounted for a much larger portion total manufacturing revenue as estimated by the NESDB in 2006 (80 percent) than in 1996 (61 percent). Much of the increase in this ratio is clearly the result of relatively rapid growth in large firms during 1996-2006, but our impression is that the relatively high ratio in 2006 also reflects the tendency for the primary data source to be more accurate for 2006 than 1996.

The primary data also included 15 observations on firms that were discovered to have their main operations in trading or services, and these data were excluded from the sample. In addition, several industries contained data for firms which were majority-controlled by a common parent, and sometimes that parent operated in the industry in question. These groups are referred to as intra-industry conglomerates in this paper. Moreover, because the primary concern is to identify industries in which ownership-related groups might have large enough shares of production to facilitate the exercise of market power, these majority-controlled conglomerate members were consolidated so that there was only one observation per group in each industry. 108 such groups were identified, 51 in 1996 and 57 in 2006. For most of these groups, the consolidation was approximate, the result of summing or weighted averaging data for the firms in a particular intra-industry group. For a few of the companies with consolidated accounting available, the consolidated estimates were used if the consolidated firm was thought to be highly concentrated in the industry in question.

For the Siam Cement Group (SCG), which is the largest conglomerate in Thailand, consolidated accounting by segment (from SCG annual reports) was used to make estimates for the industries in which the conglomerate is active. For most of these industries (paper products in both years, rubber tyres & tubes in 1996, and non-metallic mineral products in

both years), consolidated SCG groups corresponded to industry definitions, but SCG's petro group in 1996 and its chemicals' group in 2006 consisted of firms spanning more than one industry as defined in this paper (primary plastic forms and plastic products in 1996 and these two industries plus basic chemicals in 2006). In these cases, industry figures were estimated by multiplying industry shares of group totals from unconsolidated data by the consolidated group totals.

After adjustments to add missing firms, delete trading and services' firms, and consolidate members of intra-industry conglomerates, it was also necessary to estimate numerous missing values for foreign ownership shares, export status (exporter vs. non-exporter), and fixed assets. This was also accomplished using the secondary sources described above. In the context of this paper, these estimates are only relevant for CR4 firms or the smaller group of firms with market shares of 15 percent or more. And fortunately, approximate estimation of these variables (i.e., identifying minority-foreign or majority-foreign firms and exporters) was a relatively simple task for larger firms that were often included in several of the secondary sources used.

Table 1: Alternative Estimates of 4-Firm Concentration Ratios (*CR4*) and Import Protection (percent)

Industry	*CR4*, Large Firms Only			*CR4*, NESDB-adjusted			Protection, 2003	
	1996	2006	change	1996	2006	change	NRP	ERP
Manufacturing, mean of 58 industries	61	65	4	41	46	5	11	9
Meat products	56	72	16	13	31	17	14	-13
Fish products	35	51	15	16	28	11	4	-8
Fruit & vegetable products	25	44	19	22	34	11	16	27
Dairy products	78	76	-2	78	76	-2	13	12
Grain mill products	63	68	4	14	14	0	9	14
Starches, animal feeds	75	83	8	75	83	8	7	-8
Other food products	35	50	16	15	21	6	25	38
Beverages	73	70	-3	68	36	-32	37	46
Textiles spinning & weaving	47	54	6	12	14	2	13	17
Other textiles	49	43	-6	17	18	1	13	17
Knitted fabrics	62	51	-11	12	17	4	20	27
Apparel	42	44	2	3	4	1	32	45
Leather tanning & dressing	47	59	12	25	40	15	4	-26
Luggage, handbags, etc.	38	49	11	2	3	0	21	25
Footwear	61	76	15	23	39	16	21	6
Wood sawmilling & planing	63	46	-17	20	30	10	3	2
Other wood products	44	49	5	30	49	19	7	14
Paper products	64	84	20	37	52	15	6	8
Publishing	81	87	5	13	21	7	9	13
Printing	52	54	2	52	54	2	9	17
Recorded media	86	86	0	73	71	-2	2	4
Basic chemicals	63	69	5	63	69	5	8	7
Primary plastics' forms	56	58	2	21	29	8	16	16
Other chemical products	44	48	4	26	28	2	7	2
Synthetic fibers	76	56	-20	76	56	-20	4	-10
Rubber tyres & tubes	82	69	-13	82	69	-13	22	33
Other rubber products	59	60	1	51	60	9	21	17
Plastic products	42	38	-4	20	13	-7	16	15
Glass products	71	78	7	71	78	7	6	3
Non-metallic mineral products	75	91	17	49	49	-1	4	4
Ferrous metals	45	46	1	45	46	1	7	6
Non-ferrous metals	48	46	-2	48	46	-2	2	-1
Metals' casting	72	58	-14	72	58	-14	2	0
Structural metal products	46	54	8	38	54	16	13	12
Other metal products	34	45	10	18	14	-4	1	1
General purpose machinery	51	65	14	45	42	-3	12	9
Special purpose machinery	66	57	-9	35	57	22	5	2
Domestic appliances	64	71	7	34	39	5	7	5
Office & computing machinery	76	78	2	45	39	-6	3	0
Electric motors, etc.	55	47	-8	55	24	-31	7	0
Electricity distribution machinery	87	79	-8	87	79	-8	4	-1
Insulated wire & cable	99	84	-14	86	60	-27	13	6
Batteries, etc.	76	76	0	36	53	17	3	-7
Electric lamps	76	86	10	76	86	10	6	4
Other electrical machinery	50	57	7	50	57	7	11	5
Electronic components	44	48	4	44	48	4	9	2
Radio & TV transmitters, etc.	67	86	20	67	86	20	7	0
Radio & TV receivers, etc.	67	77	10	22	57	35	7	0
Medical machinery	75	65	-10	38	65	26	na	na
Optical & photographic machinery	69	84	16	31	71	40	7	0
Watches & clocks	72	78	6	20	40	20	2	-2
Motor vehicle assembly, etc.	81	78	-3	66	78	12	6	0
Motor vehicle bodies, trailers, etc.	68	81	13	19	48	29	2	0
Motor vehicle parts	46	60	14	46	60	14	24	22
Other transportation machinery	91	87	-3	91	87	-3	44	47
Furniture	46	48	2	7	12	5	na	na
Jewelry	51	75	24	3	12	9	8	6
Miscellaneous manufacturing	82	83	1	82	83	1	24	33

Note: adjusted ratios use the alternative estimates of industry revenue when they exceed large-firm revenue.
Source: Appendix Table 1.

Table 2: Shares of Conglomerates, MNCs, and Exporters in Total Revenue of All Large Firms (percent)

Industry	Conglomerates 1996	Conglomerates 2006	All foreign 1996	All foreign 2006	Majority-foreign 1996	Majority-foreign 2006	Exporters 1996	Exporters 2006
Manufacturing	22	19	58	69	34	52	63	74
Meat products	54	55	8	3	5	2	91	92
Fish products	23	36	5	8	0	0	83	97
Fruit & vegetable products	0	0	19	13	12	13	57	49
Dairy products	47	68	83	95	51	81	50	81
Grain mill products	0	0	17	21	0	12	31	76
Starches, animal feeds	70	77	17	17	12	9	84	91
Other food products	0	0	48	61	28	29	55	41
Beverages	15	49	19	30	1	5	51	36
Textiles spinning & weaving	36	35	43	33	2	6	98	97
Other textiles	0	0	62	64	12	42	31	66
Knitted fabrics	0	0	47	44	3	22	92	96
Apparel	0	0	65	66	12	35	81	81
Leather tanning & dressing	0	0	14	49	0	22	62	84
Luggage, handbags, etc.	0	0	62	79	49	60	49	55
Footwear	31	42	36	29	25	29	78	82
Wood sawmilling & planing	0	0	0	0	0	0	30	73
Other wood products	8	18	4	17	4	17	87	70
Paper products	52	56	18	51	10	41	64	91
Publishing	0	0	1	4	0	0	44	53
Printing	0	0	4	9	0	0	11	0
Recorded media	0	0	76	79	39	18	7	40
Basic chemicals	0	11	28	20	12	17	63	70
Primary plastics' forms	21	29	60	60	14	21	87	61
Other chemical products	0	0	95	100	74	87	59	44
Synthetic fibers	34	15	90	86	55	61	83	80
Rubber tyres & tubes	6	39	52	91	46	81	59	68
Other rubber products	17	28	14	36	8	26	98	100
Plastic products	7	4	18	40	6	21	88	60
Glass products	42	58	39	48	0	28	28	85
Non-metallic mineral products	74	70	6	19	2	2	85	92
Ferrous metals	11	27	43	72	0	58	24	52
Non-ferrous metals	26	11	80	82	43	56	60	86
Metals' casting	0	23	34	73	7	56	31	37
Structural metal products	18	0	36	62	0	14	26	42
Other metal products	0	11	45	49	17	35	57	64
General purpose machinery	34	47	83	97	50	90	66	86
Special purpose machinery	0	0	79	83	49	75	72	59
Domestic appliances	16	21	94	96	37	84	85	91
Office & computing machinery	0	0	97	100	93	100	85	99
Electric motors, etc.	12	0	85	91	48	59	80	73
Electricity distribution machinery	0	0	45	73	45	72	94	85
Insulated wire & cable	0	0	94	94	62	63	80	6
Batteries, etc.	0	0	84	90	28	53	91	48
Electric lamps	8	11	82	88	72	87	91	85
Other electrical machinery	0	0	69	81	61	68	58	65
Electronic components	19	0	89	100	81	92	84	92
Radio & TV transmitters, etc.	8	26	86	97	46	95	42	90
Radio & TV receivers, etc.	20	11	98	99	72	99	72	73
Medical machinery	0	0	89	88	77	83	89	88
Optical & photographic machinery	0	0	72	97	71	97	96	97
Watches & clocks	10	49	98	96	96	93	99	90
Motor vehicle assembly, etc.	38	13	89	100	40	99	58	95
Motor vehicle bodies, trailers, etc.	60	32	26	85	2	54	55	55
Motor vehicle parts	20	38	71	95	31	68	64	60
Other transportation machinery	61	55	85	97	79	96	69	77
Furniture	0	0	26	25	6	4	69	86
Jewelry	0	0	55	23	18	10	96	84
Miscellaneous manufacturing	44	54	95	96	91	73	65	76

Source: Appendix Table 2.

Table 3: Shares of Conglomerates, MNCs, and Exporters in Total Revenue of the 4 Largest Firms (percent)

Industry	Conglomerates		All foreign		Majority-foreign		Exporters	
	1996	2006	1996	2006	1996	2006	1996	2006
Manufacturing	34	27	60	69	37	51	64	78
Meat products	88	76	0	0	0	0	100	100
Fish products	54	70	15	0	0	0	85	100
Fruit & vegetable products	0	0	21	29	21	29	50	44
Dairy products	60	89	86	100	60	100	60	87
Grain mill products	0	0	14	14	0	14	0	100
Starches, animal feeds	94	93	12	14	12	7	94	100
Other food products	0	0	52	82	52	35	26	43
Beverages	21	69	13	31	0	0	56	35
Textiles spinning & weaving	77	66	31	20	0	0	100	100
Other textiles	0	0	79	73	0	52	0	78
Knitted fabrics	0	0	57	60	0	18	100	100
Apparel	0	0	100	66	18	66	82	100
Leather tanning & dressing	0	0	17	65	0	24	83	100
Luggage, handbags, etc.	0	0	50	100	50	77	21	60
Footwear	40	55	18	33	18	33	82	100
Wood sawmilling & planing	0	0	0	0	0	0	43	81
Other wood products	0	37	0	25	0	25	100	100
Paper products	81	67	10	45	10	33	73	100
Publishing	0	0	0	0	0	0	54	61
Printing	0	0	0	0	0	0	0	0
Recorded media	0	0	81	87	44	21	8	41
Basic chemicals	0	15	0	0	0	0	68	65
Primary plastics' forms	38	50	62	50	0	14	100	64
Other chemical products	0	0	100	100	79	80	71	37
Synthetic fibers	44	28	100	81	65	81	79	81
Rubber tyres & tubes	8	43	51	100	51	100	62	80
Other rubber products	28	46	0	21	0	21	100	100
Plastic products	0	0	0	26	0	0	100	77
Glass products	59	74	41	55	0	29	20	100
Non-metallic mineral products	97	77	0	18	0	0	100	95
Ferrous metals	25	58	45	61	0	61	25	78
Non-ferrous metals	53	23	78	74	59	74	100	100
Metals' casting	0	41	36	81	0	65	36	25
Structural metal products	39	0	39	76	0	22	19	46
Other metal products	0	24	39	49	0	26	42	73
General purpose machinery	66	65	86	100	66	100	80	100
Special purpose machinery	0	0	92	84	68	84	76	71
Domestic appliances	25	27	100	100	41	100	100	100
Office & computing machinery	0	0	100	100	100	100	81	100
Electric motors, etc.	22	0	100	100	61	59	100	79
Electricity distribution machinery	0	0	52	66	52	66	100	93
Insulated wire & cable	0	0	95	100	63	75	81	6
Batteries, etc.	0	0	100	100	30	52	100	36
Electric lamps	11	13	100	100	89	100	100	94
Other electrical machinery	0	0	47	71	47	71	39	52
Electronic components	44	0	86	100	86	84	67	100
Radio & TV transmitters, etc.	11	30	88	100	49	100	51	92
Radio & TV receivers, etc.	31	14	100	100	69	100	69	71
Medical machinery	0	0	100	100	93	100	100	90
Optical & photographic machinery	0	0	69	100	69	100	100	100
Watches & clocks	0	63	100	100	100	100	100	87
Motor vehicle assembly, etc.	46	14	100	100	40	100	65	100
Motor vehicle bodies, trailers, etc.	89	39	31	93	0	61	65	54
Motor vehicle parts	44	64	78	100	31	61	74	81
Other transportation machinery	67	62	90	100	85	100	71	85
Furniture	0	0	31	23	0	0	50	100
Jewelry	0	0	47	8	0	0	100	85
Miscellaneous manufacturing	54	65	100	100	100	73	62	73

Source: Appendix Table 3.

Table 4: Estimates of the Relationship between Changes in Concentration, Initial Ownership Shares, and Import Protection, 1996-2006: Ordinary Least Squares' Estimates with Robust Standard Errors (dependent variable = $\Delta CR4_{96-06,i}$)

Variable, statistic	Value	p-value	Value	p-value	Value	p-value	Value	p-value
LARGE-FIRM DATA SET, all industries								
Equation	(1)		(1a)		(1b)		(1c)	
$AKC_{96,i}$	0.2666	0.18	0.2575	0.19	0.2029	0.28	0.2722	0.17
$MES_{96,i}$	-0.0239	0.78	-0.0250	0.77	-0.0015	0.99	-0.0357	0.68
$GMS_{96-06,i}$	0.0010	0.93	0.0012	0.92	0.0020	0.86	0.0017	0.88
$CR4_{96,i}$	-0.3583	0.00	-0.3561	0.00	-0.3377	0.00	-0.3517	0.00
$CON_{96,i}$	0.1547	0.02	0.1657	0.00	0.1597	0.00	0.1697	0.00
$FOR_{96,i}$	0.0221	0.70	0.0316	0.46	-	-	0.0340	0.43
$ERP_{03,i}$	-0.1027	0.19	-0.0679	0.28	-0.0716	0.25	-	-
$FOR_{96,i}*ERP_{03,i}$	0.0011	0.64	-	-	-	-	-	-
Constant	22.0328	0.00	21.3964	0.00	21.2572	0.00	20.3147	0.00
F-test	5.34	0.00	6.12	0.00	7.57	0.00	6.35	0.00
R-squared	0.33	-	0.33	-	0.32	-	0.32	-
Observations	58	-	58	-	58	-	58	-
LARGE-FIRM DATA SET, excluding 3 outliers								
Equation	(1)		(1a)		(1b)		(1c)	
$AKC_{96,i}$	0.3906	0.04	0.3889	0.04	0.3359	0.05	0.4082	0.03
$MES_{96,i}$	-0.0750	0.32	-0.0753	0.31	-0.0505	0.50	-0.0870	0.24
$GMS_{96-06,i}$	-0.0083	0.46	-0.0083	0.46	-0.0078	0.48	-0.0078	0.49
$CR4_{96,i}$	-0.3330	0.00	-0.3325	0.00	-0.3143	0.00	-0.3281	0.00
$CON_{96,i}$	0.1786	0.00	0.1806	0.00	0.1734	0.00	0.1841	0.00
$FOR_{96,i}$	0.0316	0.53	0.0333	0.40	-	-	0.0351	0.37
$ERP_{03,i}$	-0.0980	0.18	-0.0923	0.08	-0.0944	0.08	-	-
$FOR_{96,i}*ERP_{03,i}$	0.0002	0.91	-	-	-	-	-	-
Constant	21.5796	0.00	21.4658	0.00	21.4140	0.00	20.1717	0.00
F-test	8.39	0.00	9.79	0.00	11.80	0.00	8.44	0.00
R-squared	0.41	-	0.41	-	0.40	-	0.39	-
Observations	55	-	55	-	55	-	55	-

Table 5: Estimates of the Relationship between Changes in Concentration, Ownership Share Changes, and Import Protection, 1996-2006: Ordinary Least Squares' Estimates with Robust Standard Errors (dependent variable = $\Delta CR4_{96-06,i}$)

Variable, statistic	Value	p-value	Value	p-value	Value	p-value	Value	p-value
LARGE-FIRM DATA SET, all industries								
Equation	(2)		(2a)		(2b)		(2c)	
$AKC_{96,i}$	0.2953	0.31	0.2510	0.38	0.2530	0.35	0.2834	0.31
$MES_{96,i}$	0.0501	0.64	0.0587	0.57	0.0586	0.56	0.0391	0.70
$GMS_{96-06,i}$	-0.0027	0.82	0.0012	0.82	-0.0027	0.82	-0.0021	0.86
$CR4_{96,i}$	-0.3236	0.00	-0.3561	0.00	-0.3168	0.00	-0.3032	0.00
$\Delta CON_{96-06,i}$	0.1139	0.30	0.1657	0.40	0.0921	0.39	0.0628	0.57
$\Delta FOR_{96-06,i}$	0.0608	0.57	0.0316	0.97	-	-	0.0058	0.94
$ERP_{03,i}$	0.0032	0.97	-0.0679	0.12	-0.0716	0.25	-	-
$\Delta FOR_{96-06,i} * ERP_{03,i}$	-0.0089	0.10	-	-	-	-	-	-
Constant	22.0012	0.00	22.6707	0.00	22.6272	0.00	20.7914	0.00
F-test	3.83	0.00	3.92	0.00	4.65	0.00	4.25	0.00
R-squared	0.28	-	0.24	-	0.24	-	0.22	-
Observations	58	-	58	-	58	-	58	-
LARGE-FIRM DATA SET, excluding 3 outliers								
Equation	(2)		(2a)		(2b)		(2c)	
$AKC_{96,i}$	0.4234	0.09	0.3915	0.10	0.4049	0.06	0.4275	0.06
$MES_{96,i}$	-0.0001	1.00	0.0047	0.96	0.0042	0.96	-0.0147	0.87
$GMS_{96-06,i}$	-0.0127	0.26	-0.0128	0.24	-0.0130	0.22	-0.0125	0.25
$CR4_{96,i}$	-0.2970	0.00	-0.2881	0.00	-0.2893	0.00	-0.2769	0.00
$\Delta CON_{96-06,i}$	0.0669	0.51	0.0464	0.64	0.0458	0.64	0.0179	0.86
$\Delta FOR_{96-06,i}$	0.0310	0.76	-0.0218	0.79	-	-	-0.0124	0.88
$ERP_{03,i}$	-0.0228	0.79	-0.1158	0.08	-0.1131	0.09	-	-
$\Delta FOR_{96-06,i} * ERP_{03,i}$	-0.0074	0.14	-	-	-	-	-	-
Constant	22.6786	0.00	23.1050	0.00	22.7899	0.00	21.2607	0.00
F-test	4.47	0.00	4.73	0.00	5.41	0.00	5.61	0.00
R-squared	0.31	-	0.29	-	0.24	-	0.26	-
Observations	55	-	55	-	55	-	55	-

Table 6: Ownership and Exporting Characteristics of the Largest Firms: Ordinatry Least Squares'
Estimates of Equation (3) with Robust Standard Errors (dependent variable = S_{ijt})

Variable, statistic	Largest Firms 1 (S_{ijt}>=15%)				Largest Firms 2 (S_{ijt}>=10%)				CR4 Firms			
	1996		2006		1996		2006		1996		2006	
	Value	p-value	Value	p-value	Value	p-value	Value	p-value	Value	p-value	Value	p-value
1. Firms meeting sample size criteria in both years (incumbents)												
DC_{ijt}	6.6997	0.05	5.1150	0.08	4.3361	0.11	3.7866	0.19	5.1468	0.03	3.9850	0.08
DF_{ijt}	3.1599	0.26	4.6136	0.47	6.3824	0.00	1.9369	0.43	6.4656	0.00	0.7776	0.68
DX_{ijt}	1.1198	0.68	4.0430	0.29	2.3804	0.31	3.5136	0.20	1.5088	0.44	3.6713	0.08
SK_{ijt}	0.7341	0.63	0.1964	0.31	1.4006	0.29	1.4991	0.19	0.7042	0.49	2.3666	0.02
$CR4_{jt}$	0.4824	0.00	0.5064	0.00	0.3499	0.00	0.3548	0.00	0.3006	0.00	0.2972	0.00
Constant	-8.5985	0.31	-14.5492	0.05	-6.1503	0.24	-8.3056	0.14	-4.9319	0.20	-7.2243	0.08
F-test	5.08	0.00	8.46	0.00	7.35	0.00	6.02	0.00	9.84	0.00	8.58	0.00
R-squared	0.38	-	0.42	-	0.35	-	0.26	-	0.33	-	0.28	-
Observations	47	-	47	-	83	-	83	-	126	-	126	-
2. Firms meeting sample size critieria in one year but not in the other												
	exiting firms		new entrants		exiting firms		new entrants		exiting firms		new entrants	
DC_{ijt}	-2.3034	0.17	-0.5564	0.79	-0.2035	0.92	0.0408	0.98	0.9853	0.55	0.2399	0.91
DF_{ijt}	-0.3528	0.82	2.1462	0.20	-2.2429	0.20	0.2624	0.83	-0.4688	0.72	0.4399	0.76
DX_{ijt}	-0.3379	0.89	1.5226	0.51	-0.7639	0.71	1.0685	0.52	0.8780	0.49	1.0374	0.54
SK_{ijt}	-0.2651	0.85	2.4618	0.00	-0.2769	0.76	2.4013	0.00	-0.0134	0.99	2.0267	0.01
$CR4_{jt}$	0.0221	0.68	0.1332	0.01	0.1688	0.00	0.2335	0.00	0.0842	0.04	0.0921	0.12
Constant	19.7648	0.00	6.9087	0.07	7.0110	0.01	-1.8851	0.60	5.6307	0.01	3.6565	0.29
F-test	0.58	0.07	12.41	0.00	4.16	0.00	11.56	0.00	1.46	0.21	2.03	0.08
R-squared	0.72	-	0.43	-	0.19	-	0.43	-	0.05	-	0.21	-
Observations	37	-	44	-	61	-	82	-	106	-	105	-

Appendix Table 1: Total Revenue or Output in Thai Manufacturing and Large Manufacturing Firms (billion baht)

	1996				2006		
	Official Estimates		Large firms		Official,	Large firms	
Industry	NESDB	NSO	All firms	4 largest	NESDB	All firms	4 largest
Manufacturing	3,897.98	3,540.54	2,367.96	1,505.44	8,304.93	6,604.20	4,569.87
Meat products	121.94	26.11	29.24	16.40	169.78	72.82	52.25
Fish products	127.60	118.52	58.21	20.50	208.76	113.53	57.46
Fruit & vegetable products	47.92	78.52	42.39	10.77	92.62	70.92	31.42
Dairy products	24.27	16.82	25.13	19.62	64.47	80.16	60.62
Grain mill products	132.59	71.87	29.29	18.57	271.98	56.27	38.03
Starches, animal feeds	77.46	61.83	77.66	58.43	86.47	151.36	126.13
Other food products	102.07	108.68	44.48	15.39	169.76	71.71	36.05
Beverages	144.19	118.95	133.46	97.71	346.56	175.27	123.26
Textiles spinning & weaving	229.25	133.68	58.69	27.75	304.59	77.70	41.66
Other textiles	33.09	41.57	11.14	5.50	43.78	18.39	7.91
Knitted fabrics	45.74	8.30	9.21	5.67	63.29	21.00	10.63
Apparel	314.44	78.61	20.25	8.53	408.87	39.08	17.09
Leather tanning & dressing	14.12	12.07	7.45	3.50	13.13	8.80	5.21
Luggage, handbags, etc.	70.09	8.66	4.31	1.63	128.44	7.14	3.48
Footwear	46.51	27.57	17.65	10.72	54.60	28.31	21.47
Wood sawmilling & planing	13.62	16.86	4.31	2.71	11.09	7.32	3.34
Other wood products	10.72	29.43	7.37	3.25	15.32	18.18	8.99
Paper products	70.76	164.20	41.15	26.33	149.55	92.08	77.44
Publishing	39.23	18.36	6.46	5.27	38.64	9.29	8.05
Printing	8.50	40.35	13.06	6.81	21.11	23.66	12.79
Recorded media	235.65	149.22	200.11	172.25	1,010.99	835.95	719.07
Basic chemicals	11.89	56.89	70.07	44.49	25.86	618.27	425.56
Primary plastics' forms	80.50	36.79	29.59	16.53	379.50	188.42	109.51
Other chemical products	68.78	123.86	40.02	17.57	140.89	81.78	38.95
Synthetic fibers	0.00	11.20	23.25	17.67	0.00	77.47	43.55
Rubber tyres & tubes	25.50	30.31	30.44	24.98	71.55	79.20	54.63
Other rubber products	61.99	109.45	53.01	31.48	179.18	183.47	110.15
Plastic products	50.80	93.19	24.19	10.14	148.95	50.84	19.30
Glass products	13.69	18.32	26.27	18.57	27.25	30.49	23.71
Non-metallic mineral products	159.88	163.88	105.49	79.00	244.31	129.75	118.69
Ferrous metals	58.83	69.22	72.09	32.62	62.78	200.29	92.95
Non-ferrous metals	3.64	7.34	18.11	8.78	20.92	87.28	40.32
Metals' casting	0.00	18.12	3.89	2.79	0.00	17.62	10.18
Structural metal products	18.31	62.17	15.08	6.94	22.45	31.26	16.91
Other metal products	64.46	97.15	33.00	11.37	213.96	64.95	28.92
General purpose machinery	58.04	71.41	51.34	26.18	189.67	122.39	79.05
Special purpose machinery	32.59	48.68	17.40	11.56	36.55	40.20	23.03
Domestic appliances	89.30	45.37	47.39	30.52	171.41	94.51	67.13
Office & computing machinery	178.13	135.08	105.93	79.99	690.82	348.34	270.95
Electric motors, etc.	14.03	13.96	20.59	11.39	60.85	30.57	14.52
Electricity distribution machinery	0.00	61.76	6.99	6.09	0.00	41.53	32.85
Insulated wire & cable	7.31	9.84	6.40	6.32	18.26	12.97	10.93
Batteries, etc.	9.97	3.33	4.69	3.57	17.77	12.36	9.39
Electric lamps	3.21	5.04	13.21	10.04	8.80	20.60	17.70
Other electrical machinery	8.50	38.92	29.84	14.93	21.86	46.02	26.10
Electronic components	95.86	99.94	167.88	74.03	302.37	407.28	196.70
Radio & TV transmitters, etc.	0.00	12.88	22.36	14.93	0.00	36.53	31.54
Radio & TV receivers, etc.	124.86	90.40	40.76	27.11	137.20	101.07	77.80
Medical machinery	10.28	5.20	5.26	3.95	11.09	13.97	9.06
Optical & photographic machinery	12.80	11.98	5.87	4.03	52.58	44.23	37.36
Watches & clocks	30.18	6.56	8.59	6.18	28.70	14.77	11.55
Motor vehicle assembly, etc.	265.53	330.62	215.77	175.70	690.89	822.92	645.13
Motor vehicle bodies, trailers, etc.	25.84	58.31	7.31	4.95	34.17	20.26	16.37
Motor vehicle parts	2.72	77.33	84.56	38.90	19.25	236.69	140.86
Other transportation machinery	35.23	15.19	47.74	43.24	63.15	132.29	115.19
Furniture	90.44	44.35	13.15	6.11	97.40	23.59	11.43
Jewelry	189.82	30.27	9.88	5.02	334.74	53.36	39.90
Miscellaneous manufacturing	10.22	45.60	43.11	35.41	18.01	89.73	74.82

Appendix Table 1 (continued)

| Industry | 1996 | | | | 2006 | | |
| | Official Estimates | | Large firms | | Official, | Large firms | |
	NESDB	NSO	All firms	4 largest	NESDB	All firms	4 largest
Omitted industries	75.07	50.26	6.43	5.12	87.98	18.00	14.88
Tobacco	39.36	43.02	1.43	1.08	42.46	3.83	3.53
Fur products	0.00	1.11	0.03	0.03	0.00	0.29	0.29
Recorded media	0.00	0.76	3.16	2.86	0.00	6.49	5.05
Coke oven products	0.00	1.88	0.16	0.16	0.00	0.96	0.96
Nuclear fuel processing	0.00	D	0.00	0.00	0.00	0.00	0.00
Ships & boats	34.46	3.49	1.64	1.00	43.97	5.38	4.20
Railway	1.25	D	0.00	0.00	1.55	0.02	0.02
Aircraft & spacecraft	0.00	D	0.00	0.00	0.00	1.03	0.84

Notes and Sources: NESDB=national accounts estimates from National Economic and Social Development Board (2008); NSO=industrial census estimates from National Statistics Office (1999); estimates for large firms compiled from the authors' large-firm database (see Appendix A for detailed description and sources).

Appendix Table 2: Total Revenue in Conglomerates, Foreign Multinationals, and Exporters (billion baht)

Industry	Conglomerates		All foreign		Majority-foreign		Exporters	
	1996	2006	1996	2006	1996	2006	1996	2006
Manufacturing	519.62	1,266.43	1,364.31	4,538.57	809.05	3,405.33	1,493.95	4,860.64
Meat products	15.75	39.84	2.38	2.52	1.36	1.25	26.73	66.99
Fish products	13.48	40.38	3.13	8.76	0.00	0.00	48.14	109.92
Fruit & vegetable products	0.00	0.00	7.86	9.17	4.89	9.17	24.28	34.79
Dairy products	11.81	54.18	20.81	75.95	12.87	65.25	12.52	64.99
Grain mill products	0.00	0.00	4.92	12.01	0.00	6.57	9.15	42.52
Starches, animal feeds	54.72	116.81	13.20	25.97	9.47	14.35	65.49	137.89
Other food products	0.00	0.00	21.29	43.99	12.55	20.73	24.36	29.55
Beverages	20.40	85.13	25.17	52.52	1.78	8.03	68.26	63.72
Textiles spinning & weaving	21.37	27.38	25.06	25.59	1.34	4.37	57.49	75.37
Other textiles	0.00	0.00	6.95	11.72	1.31	7.68	3.44	12.11
Knitted fabrics	0.00	0.00	4.31	9.17	0.31	4.72	8.52	20.16
Apparel	0.00	0.00	13.10	25.62	2.36	13.57	16.35	31.63
Leather tanning & dressing	0.00	0.00	1.03	4.30	0.00	1.89	4.60	7.37
Luggage, handbags, etc.	0.00	0.00	2.65	5.61	2.12	4.31	2.09	3.94
Footwear	5.50	11.83	6.43	8.14	4.43	8.14	13.71	23.30
Wood sawmilling & planing	0.00	0.00	0.00	0.00	0.00	0.00	1.30	5.37
Other wood products	0.62	3.33	0.29	3.06	0.29	3.06	6.43	12.78
Paper products	21.29	51.86	7.23	46.79	4.03	37.58	26.21	83.81
Publishing	0.00	0.00	0.05	0.34	0.00	0.00	2.83	4.93
Printing	0.00	0.00	0.57	2.04	0.00	0.00	1.48	0.00
Recorded media	0.00	0.00	152.25	657.26	78.85	150.12	14.44	338.15
Basic chemicals	0.00	65.94	19.35	124.40	8.62	106.36	44.23	432.62
Primary plastics' forms	6.36	54.56	17.87	112.40	4.02	39.36	25.83	114.64
Other chemical products	0.00	0.00	37.99	81.78	29.60	70.96	23.78	35.74
Synthetic fibers	7.79	11.98	21.02	66.69	12.83	47.61	19.22	61.88
Rubber tyres & tubes	1.92	30.71	15.94	71.81	14.14	64.22	18.05	53.87
Other rubber products	8.85	50.95	7.65	66.78	4.27	47.50	51.96	183.47
Plastic products	1.74	2.15	4.33	20.21	1.35	10.54	21.39	30.69
Glass products	10.90	17.64	10.32	14.55	0.00	8.49	7.34	25.86
Non-metallic mineral products	78.56	90.99	6.10	24.45	1.73	3.08	89.41	119.15
Ferrous metals	8.24	53.90	30.95	143.52	0.00	116.20	17.52	104.68
Non-ferrous metals	4.69	9.27	14.57	71.67	7.81	48.49	10.87	74.89
Metals' casting	0.00	4.13	1.34	12.92	0.26	9.84	1.21	6.44
Structural metal products	2.71	0.00	5.46	19.25	0.00	4.41	3.93	13.06
Other metal products	0.00	7.00	14.92	32.13	5.59	22.75	18.83	41.82
General purpose machinery	17.32	57.26	42.53	119.26	25.58	110.73	33.67	105.09
Special purpose machinery	0.00	0.00	13.77	33.20	8.61	30.05	12.62	23.73
Domestic appliances	7.72	19.94	44.64	91.11	17.69	79.04	40.22	85.92
Office & computing machinery	0.00	0.00	102.96	346.88	98.07	346.88	89.92	344.92
Electric motors, etc.	2.53	0.00	17.40	27.71	9.92	17.97	16.56	22.17
Electricity distribution machinery	0.00	0.00	3.16	30.35	3.16	29.86	6.56	35.17
Insulated wire & cable	0.00	0.00	5.99	12.18	3.95	8.20	5.15	0.72
Batteries, etc.	0.00	0.00	3.92	11.10	1.32	6.54	4.27	6.00
Electric lamps	1.11	2.24	10.90	18.05	9.57	17.87	12.06	17.55
Other electrical machinery	0.00	0.00	20.66	37.48	18.06	31.19	17.32	29.71
Electronic components	32.55	0.00	149.34	407.28	136.47	376.03	140.58	373.86
Radio & TV transmitters, etc.	1.68	9.34	19.19	35.51	10.34	34.62	9.50	32.95
Radio & TV receivers, etc.	8.30	11.14	40.12	100.00	29.24	100.00	29.42	73.48
Medical machinery	0.00	0.00	4.66	12.29	4.07	11.54	4.67	12.31
Optical & photographic machinery	0.00	0.00	4.21	43.11	4.19	43.00	5.66	43.00
Watches & clocks	0.83	7.25	8.46	14.21	8.22	13.81	8.48	13.23
Motor vehicle assembly, etc.	81.64	110.41	192.59	822.92	86.80	815.05	125.22	780.02
Motor vehicle bodies, trailers, etc.	4.38	6.45	1.93	17.12	0.14	11.00	4.03	11.05
Motor vehicle parts	16.93	90.78	59.72	225.34	25.83	160.89	54.07	141.11
Other transportation machinery	28.92	73.22	40.47	127.85	37.73	126.98	32.88	102.21
Furniture	0.00	0.00	3.48	5.98	0.77	1.00	9.11	20.24
Jewelry	0.00	0.00	5.46	12.08	1.80	5.31	9.52	44.77
Miscellaneous manufacturing	19.00	48.45	40.79	86.05	39.21	65.68	27.96	68.08

Appendix Table 2 (continued)

Industry	Conglomerates		All Foreign		Maj. Foreign		Exporters	
	1996	2006	1996	2006	1996	2006	1996	2006
Omitted industries	0.00	0.00	1.47	8.40	0.13	1.50	3.14	5.26
Tobacco	0.00	0.00	0.68	3.37	0.00	0.00	0.73	3.06
Fur products	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.29
Recorded media	0.00	0.00	0.14	0.56	0.00	0.18	2.38	0.93
Coke oven products	0.00	0.00	0.13	0.00	0.13	0.00	0.00	0.00
Nuclear fuel processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ships & boats	0.00	0.00	0.52	3.44	0.00	0.29	0.00	0.07
Railway	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Aircraft & spacecraft	0.00	0.00	0.00	1.02	0.00	1.02	0.00	0.92

Sources: compiled from the authors' large-firm database (see Appendix A for detailed description and sources).

Appendix Table 3: Total Revenue in Conglomerates, Foreign Multinationals, and Exporters Among the 4 Largest Firms (billion baht)

Industry	Conglomerates		All foreign		Majority-foreign		Exporters	
	1996	2006	1996	2006	1996	2006	1996	2006
Manufacturing	509.37	1,223.69	906.25	3,133.93	561.03	2,334.51	961.23	3,552.71
Meat products	14.39	39.84	0.00	0.00	0.00	0.00	16.40	52.25
Fish products	11.11	40.38	3.13	0.00	0.00	0.00	17.37	57.46
Fruit & vegetable products	0.00	0.00	2.27	9.17	2.27	9.17	5.35	13.73
Dairy products	11.81	54.18	16.90	60.62	11.81	60.62	11.72	52.47
Grain mill products	0.00	0.00	2.54	5.47	0.00	5.47	0.00	38.03
Starches, animal feeds	54.72	116.81	6.80	17.77	6.80	8.45	54.72	126.13
Other food products	0.00	0.00	8.02	29.57	8.02	12.70	4.01	15.43
Beverages	20.40	85.13	12.50	38.14	0.00	0.00	54.27	42.65
Textiles spinning & weaving	21.37	27.38	8.64	8.18	0.00	0.00	27.75	41.66
Other textiles	0.00	0.00	4.33	5.80	0.00	4.10	0.00	6.21
Knitted fabrics	0.00	0.00	3.24	6.39	0.00	1.95	5.67	10.63
Apparel	0.00	0.00	8.53	11.21	1.50	11.21	7.03	17.09
Leather tanning & dressing	0.00	0.00	0.58	3.40	0.00	1.25	2.92	5.21
Luggage, handbags, etc.	0.00	0.00	0.82	3.48	0.82	2.67	0.35	2.10
Footwear	4.34	11.83	1.96	7.06	1.96	7.06	8.76	21.47
Wood sawmilling & planing	0.00	0.00	0.00	0.00	0.00	0.00	1.16	2.69
Other wood products	0.00	3.33	0.00	2.28	0.00	2.28	3.25	8.99
Paper products	21.29	51.86	2.63	34.79	2.63	25.58	19.10	77.44
Publishing	0.00	0.00	0.00	0.00	0.00	0.00	2.83	4.93
Printing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recorded media	0.00	0.00	139.14	624.36	75.85	150.12	14.44	293.68
Basic chemicals	0.00	65.94	0.00	0.00	0.00	0.00	30.14	277.54
Primary plastics' forms	6.36	54.56	10.17	54.94	0.00	15.19	16.53	69.75
Other chemical products	0.00	0.00	17.57	38.95	13.91	31.20	12.49	14.52
Synthetic fibers	7.79	11.98	17.67	35.28	11.50	35.28	13.96	35.28
Rubber tyres & tubes	1.92	23.24	12.82	54.63	12.82	54.63	15.42	43.54
Other rubber products	8.85	50.95	0.00	23.61	0.00	23.61	31.48	110.15
Plastic products	0.00	0.00	0.00	4.95	0.00	0.00	10.14	14.81
Glass products	10.90	17.64	7.66	12.96	0.00	6.89	3.74	23.71
Non-metallic mineral products	76.39	90.99	0.00	21.37	0.00	0.00	79.00	112.36
Ferrous metals	8.24	53.90	14.76	57.14	0.00	57.14	8.24	72.31
Non-ferrous metals	4.69	9.27	6.84	29.83	5.14	29.83	8.78	40.32
Metals' casting	0.00	4.13	1.00	8.27	0.00	6.63	1.00	2.50
Structural metal products	2.71	0.00	2.71	12.87	0.00	3.67	1.33	7.71
Other metal products	0.00	7.00	4.47	14.07	0.00	7.38	4.77	21.07
General purpose machinery	17.32	51.69	22.57	79.05	17.32	79.05	20.93	79.05
Special purpose machinery	0.00	0.00	10.59	19.32	7.83	19.32	8.80	16.28
Domestic appliances	7.72	17.81	30.52	67.13	12.53	67.13	30.52	67.13
Office & computing machinery	0.00	0.00	79.99	270.95	79.99	270.95	64.50	270.95
Electric motors, etc.	2.53	0.00	11.39	14.52	6.98	8.54	11.39	11.54
Electricity distribution machinery	0.00	0.00	3.16	21.84	3.16	21.84	6.09	30.64
Insulated wire & cable	0.00	0.00	5.99	10.93	3.95	8.15	5.15	0.67
Batteries, etc.	0.00	0.00	3.57	9.39	1.08	4.86	3.57	3.42
Electric lamps	1.11	2.24	10.04	17.70	8.93	17.70	10.04	16.62
Other electrical machinery	0.00	0.00	7.07	18.43	7.07	18.43	5.86	13.58
Electronic components	32.55	0.00	63.39	196.70	63.39	165.44	49.67	196.70
Radio & TV transmitters, etc.	1.68	9.34	13.20	31.54	7.34	31.54	7.60	29.10
Radio & TV receivers, etc.	8.30	11.14	27.11	77.80	18.81	77.80	18.81	55.29
Medical machinery	0.00	0.00	3.95	9.06	3.66	9.06	3.95	8.14
Optical & photographic machinery	0.00	0.00	2.76	37.36	2.76	37.36	4.03	37.36
Watches & clocks	0.00	7.25	6.18	11.55	6.18	11.55	6.18	10.07
Motor vehicle assembly, etc.	81.64	87.20	175.70	645.13	70.59	645.13	114.21	645.13
Motor vehicle bodies, trailers, etc.	4.38	6.45	1.51	15.23	0.00	9.91	3.22	8.90
Motor vehicle parts	16.93	90.78	30.18	140.86	11.97	86.16	28.90	114.14
Other transportation machinery	28.92	70.99	38.77	115.19	36.92	115.19	30.77	97.38
Furniture	0.00	0.00	1.88	2.68	0.00	0.00	3.03	11.43
Jewelry	0.00	0.00	2.36	3.29	0.00	0.00	5.02	33.87
Miscellaneous manufacturing	19.00	48.45	35.41	74.82	35.41	54.45	21.84	54.45

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Appendix Table 3 (continued)

Industry	Conglomerates		All Foreign		Maj. Foreign		Exporters	
	1996	2006	1996	2006	1996	2006	1996	2006
Omitted industries	0.00	0.00	1.28	6.90	0.13	0.85	3.08	5.11
Tobacco	0.00	0.00	0.62	3.19	0.00	0.00	0.67	3.06
Fur products	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.29
Recorded media	0.00	0.00	0.14	0.00	0.00	0.00	2.38	0.93
Coke oven products	0.00	0.00	0.13	0.00	0.13	0.00	0.00	0.00
Nuclear fuel processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ships & boats	0.00	0.00	0.40	2.86	0.00	0.00	0.00	0.00
Railway	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Aircraft & spacecraft	0.00	0.00	0.00	0.84	0.00	0.84	0.00	0.84

Sources: compiled from the authors' large-firm database (see Appendix A for detailed description and sources).

Appendix Table 4: Alternative Estimates of the Relationship between Changes in Concentration, Initial Ownership Shares, and Import Protection, 1996-2006: Ordinary Least Squares' Estimates with Robust Standard Errors (dependent variable = $\Delta CR4_{96\text{-}06,i}$)

Variable, statistic	Value	p-value	Value	p-value	Value	p-value	Value	p-value
LARGE-FIRM DATA SET, all industries								
Equation	(1d)		(1e)		(1f)		(1g)	
$AKC_{96,i}$	0.3278	0.22	0.3084	0.25	0.2809	0.27	0.3284	0.22
$MES_{96,i}$	0.0173	0.86	0.0248	0.80	0.0354	0.71	0.0129	0.90
$GMS_{96\text{-}06,i}$	-0.0031	0.79	-0.0034	0.76	-0.0029	0.79	-0.0029	0.80
$CR4_{96,i}$	-0.3291	0.00	-0.3117	0.00	-0.3035	0.00	-0.3048	0.00
$FOR_{96,i}$	-0.0133	0.79	0.0152	0.73	-	-	0.0177	0.68
$ERP_{03,i}$	-0.1984	0.01	-0.0846	0.22	-0.0861	0.21	-	-
$FOR_{96,i}*ERP_{03,i}$	0.0037	0.03	-	-	-	-	-	-
Constant	24.1193	0.00	22.1337	0.00	22.0526	0.00	20.8010	0.00
F-test	5.08	0.00	4.99	0.00	5.96	0.00	5.30	0.00
R-squared	0.26	-	0.23	-	0.23	-	0.22	-
Observations	58	-	58	-	58	-	58	-
LARGE-FIRM DATA SET, all NESDB/NSO industries								
Equation	(1d)		(1e)		(1f)		(1g)	
$AKC_{96,i}$	0.2823	0.33	0.2670	0.35	0.2604	0.33	0.2977	0.31
$MES_{96,i}$	-0.0022	0.98	0.0011	0.99	0.0034	0.97	-0.0105	0.92
$GMS_{96\text{-}06,i}$	0.0014	0.91	0.0011	0.92	0.0013	0.91	0.0016	0.90
$CR4_{96,i}$	-0.2824	0.00	-0.2642	0.00	-0.2622	0.00	-0.2613	0.00
$FOR_{96,i}$	-0.0227	0.63	0.0033	0.94	-	-	0.0068	0.87
$ERP_{03,i}$	-0.2121	0.01	-0.1153	0.07	-0.1156	0.07	-	-
$FOR_{96,i}*ERP_{03,i}$	0.0033	0.03	-	-	-	-	-	-
Constant	21.8475	0.00	19.9917	0.00	19.9629	0.00	18.4694	0.00
F-test	4.06	0.00	3.89	0.00	4.70	0.00	3.86	0.01
R-squared	0.26	-	0.23	-	0.23	-	0.20	-
Observations	54	-	54	-	54	-	54	-
LARGE-FIRM DATA SET, NESDB/NSO industries excluding 2 outliers								
Equation	(1d)		(1e)		(1f)		(1g)	
$AKC_{96,i}$	0.4053	0.12	0.3762	0.16	0.3835	0.11	0.4082	0.12
$MES_{96,i}$	-0.0099	0.91	-0.0055	0.95	-0.0081	0.93	-0.0158	0.86
$GMS_{96\text{-}06,i}$	-0.0087	0.48	-0.0082	0.50	-0.0083	0.48	-0.0084	0.50
$CR4_{96,i}$	-0.2975	0.00	-0.2759	0.00	-0.2780	0.00	-0.2745	0.00
$FOR_{96,i}$	-0.0344	0.47	-0.0039	0.93	-	-	-0.0017	0.97
$ERP_{03,i}$	-0.2123	0.01	-0.1001	0.12	-0.0999	0.12	-	-
$FOR_{96,i}*ERP_{03,i}$	0.0038	0.01	-	-	-	-	-	-
Constant	23.7719	0.00	21.5452	0.00	21.5704	0.00	20.3792	0.00
F-test	5.40	0.00	4.42	0.00	5.42	0.00	5.15	0.00
R-squared	0.30	-	0.27	-	0.27	-	0.24	-
Observations	52	-	52	-	52	-	52	-

Appendix Table 4 (continued)

Variable, statistic	Value	p-value	Value	p-value	Value	p-value	Value	p-value
NESDB/NSO-ADJUSTED DATA SET, all NESDB/NSO industries								
Equation	(1d)		(1e)		(1f)		(1g)	
$AKC_{96,i}$	-0.2568	0.17	-0.2858	0.13	-0.2655	0.14	-0.3078	0.11
$MES_{96,i}$	0.2046	0.26	0.2459	0.18	0.2856	0.13	0.2764	0.14
$GMS_{96-06,i}$	-0.0182	0.37	-0.0177	0.39	-0.0154	0.45	-0.0185	0.35
$CR4_{96,i}$	-0.1378	0.10	-0.1570	0.05	-0.1560	0.04	-0.1683	0.04
$FOR_{96,i}$	0.1736	0.09	0.1360	0.14	-	-	0.1631	0.09
$ERP_{03,i}$	-0.0876	0.67	-0.1806	0.21	-0.2280	0.13	-	-
$FOR_{96,i}*ERP_{03,i}$	-0.0071	0.24	-	-	-	-	-	-
Constant	10.3555	0.05	11.6526	0.01	14.3170	0.00	9.6839	0.01
F-test	3.32	0.01	2.67	0.03	3.46	0.01	3.24	0.01
R-squared	0.26	-	0.24	-	0.19	-	0.20	-
Observations	54	-	54	-	54	-	54	-
NESDB/NSO-ADJUSTED DATA SET, NESDB/NSO industries excluding 2 outliers								
Equation	(1d)		(1e)		(1f)		(1g)	
$AKC_{96,i}$	-0.1645	0.34	-0.1776	0.29	-0.1570	0.30	-0.1965	0.25
$MES_{96,i}$	0.1871	0.30	0.2122	0.24	0.2234	0.20	0.2405	0.20
$GMS_{96-06,i}$	-0.0254	0.26	-0.0254	0.26	-0.0255	0.24	-0.0264	0.22
$CR4_{96,i}$	-0.1292	0.11	-0.1408	0.06	-0.1384	0.06	-0.1534	0.06
$FOR_{96,i}$	0.0897	0.28	0.0611	0.40	-	-	0.0863	0.28
$ERP_{03,i}$	-0.1150	0.58	-0.1754	0.23	-0.1931	0.19	-	-
$FOR_{96,i}*ERP_{03,i}$	-0.0046	0.42	-	-	-	-	-	-
Constant	11.9485	0.03	12.8570	0.01	14.0158	0.00	11.0951	0.00
F-test	2.88	0.01	2.96	0.02	2.96	0.02	2.82	0.03
R-squared	0.23	-	0.22	-	0.22	-	0.19	-
Observations	52	-	52	-	52	-	52	-

Appendix Table 5: Alternative Estimates of the Relationship between Changes in Concentration, Ownership Share Changes, and Import Protection, 1996-2006: Ordinary Least Squares' Estimates with Robust Standard Errors (dependent variable = $\Delta CR4_{96\text{-}06,i}$)

Variable, statistic	Value	p-value	Value	p-value	Value	p-value	Value	p-value
LARGE-FIRM DATA SET; all industries								
Equation	(2d)		(2e)		(2f)		(2g)	
$AKC_{96,i}$	0.3264	0.24	0.2808	0.30	0.2809	0.27	0.3006	0.26
$MES_{96,i}$	0.0228	0.83	0.0354	0.71	0.0354	0.71	0.0248	0.79
$GMS_{96\text{-}06,i}$	-0.0031	0.79	-0.0029	0.80	-0.0029	0.79	-0.0024	0.84
$CR4_{96,i}$	-0.3069	0.00	-0.3035	0.00	-0.3035	0.00	-0.2955	0.00
$\Delta FOR_{96\text{-}06,i}$	0.0573	0.58	-0.0002	1.00	-	-	0.0067	0.93
$ERP_{03,i}$	0.0151	0.88	-0.0861	0.22	-0.0861	0.21	-	-
$\Delta FOR_{96\text{-}06,i} * ERP_{03,i}$	-0.0079	0.10	-	-	-	-	-	-
Constant	21.3315	0.00	22.0552	0.00	22.0526	0.00	20.6000	0.00
F-test	5.15	0.00	4.89	0.00	5.96	0.00	5.00	0.00
R-squared	0.26	-	0.23	-	0.23	-	0.22	-
Observations	58	-	58	-	58	-	58	-
LARGE-FIRM DATA SET, all NESDB/NSO industries								
Equation	(2d)		(2e)		(2f)		(2g)	
$AKC_{96,i}$	0.2853	0.33	0.2495	0.38	0.2604	0.33	0.2776	0.33
$MES_{96,i}$	-0.0080	0.94	0.0047	0.96	0.0034	0.97	-0.0051	0.96
$GMS_{96\text{-}06,i}$	0.0016	0.89	0.0014	0.90	0.0013	0.91	0.0020	0.87
$CR4_{96,i}$	-0.2620	0.00	-0.2620	0.00	-0.2622	0.00	-0.2572	0.00
$\Delta FOR_{96\text{-}06,i}$	0.0374	0.68	-0.0217	0.77	-	-	-0.0143	0.84
$ERP_{03,i}$	-0.0275	0.75	-0.1175	0.07	-0.1156	0.07	-	-
$\Delta FOR_{96\text{-}06,i} * ERP_{03,i}$	-0.0071	0.11	-	-	-	-	-	-
Constant	19.3957	0.00	20.2937	0.00	19.9629	0.00	18.6028	0.00
F-test	3.83	0.00	4.02	0.00	4.70	0.00	3.87	0.01
R-squared	0.26	-	0.23	-	0.23	-	0.20	-
Observations	54	-	54	-	54	-	54	-
LARGE-FIRM DATA SET, NESDB/NSO industries excluding 2 outliers								
Equation	(2d)		(2e)		(2f)		(2g)	
$AKC_{96,i}$	0.3953	0.14	0.3688	0.15	0.3835	0.11	0.3992	0.11
$MES_{96,i}$	-0.0182	0.84	-0.0065	0.94	-0.0081	0.93	-0.0157	0.86
$GMS_{96\text{-}06,i}$	-0.0076	0.53	-0.0083	0.48	-0.0083	0.48	-0.0084	0.48
$CR4_{96,i}$	-0.2785	0.00	-0.2784	0.00	-0.2780	0.00	-0.2757	0.00
$\Delta FOR_{96\text{-}06,i}$	0.0214	0.82	-0.0332	0.66	-	-	-0.0282	0.71
$ERP_{03,i}$	-0.0174	0.84	-0.1021	0.11	-0.0999	0.12	-	-
$\Delta FOR_{96\text{-}06,i} * ERP_{03,i}$	-0.0067	0.13	-	-	-	-	-	-
Constant	21.3039	0.00	22.1320	0.00	21.5704	0.00	20.8464	0.00
F-test	4.46	0.00	4.79	0.00	5.42	0.00	5.59	0.00
R-squared	0.29	-	0.27	-	0.27	-	0.24	-
Observations	52	-	52	-	52	-	52	-

Appendix Table 6: Industrial Census Estimates of Output Shares for Foreign MNCs and Exporters in 1996 (percent)
Estimates of Import Protection in 2003 (percent)

Industry	Foreign MNCs			Exporters	
	All	Majority	Wholly	All	Majority
Manufacturing	46.83	19.78	9.73	61.45	29.45
Meat products	29.51	7.84	0.70	63.07	44.45
Fish products	27.57	1.11	0.50	75.70	72.64
Fruit & vegetable products	22.58	7.40	2.13	62.14	49.61
Dairy products	21.58	2.87	0.00	21.11	0.00
Grain mill products	8.17	0.71	0.00	39.77	28.35
Starches, animal feeds	18.76	0.00	0.00	11.43	5.87
Other food products	28.34	11.96	5.60	74.66	53.40
Beverages	21.52	0.13	0.00	24.44	8.33
Textiles spinning & weaving	44.07	5.08	0.89	60.12	27.26
Other textiles	63.09	23.39	16.74	47.15	16.04
Knitted fabrics	39.07	0.92	0.00	60.87	17.24
Apparel	30.86	1.89	0.56	72.44	55.22
Leather tanning & dressing	14.74	12.24	0.00	47.15	41.07
Luggage, handbags, etc.	40.95	36.67	19.30	68.78	61.16
Footwear	22.10	3.04	1.10	56.04	48.50
Wood sawmilling & planing	12.95	0.06	0.00	31.15	25.55
Other wood products	25.90	0.89	0.00	64.65	37.75
Paper products	36.62	2.56	0.04	48.09	5.16
Publishing	22.22	0.16	0.00	10.15	1.57
Printing	8.90	0.11	0.01	2.52	0.11
Recorded media	54.04	51.68	0.00	96.24	0.00
Basic chemicals	27.88	7.49	2.66	51.33	10.45
Primary plastics' forms	42.90	7.94	3.13	82.52	9.08
Other chemical products	54.19	38.74	8.72	57.80	6.61
Synthetic fibers	87.26	39.39	39.39	93.86	47.08
Rubber tyres & tubes	67.20	57.09	0.13	74.29	35.48
Other rubber products	30.71	6.44	4.09	84.13	76.28
Plastic products	26.71	12.67	7.43	53.28	25.81
Glass products	44.81	0.77	0.00	57.41	5.23
Non-metallic mineral products	16.91	9.89	0.56	23.61	2.70
Ferrous metals	19.33	4.49	0.02	38.25	1.98
Non-ferrous metals	48.27	4.77	2.57	44.44	4.32
Metals' casting	49.84	0.49	0.00	30.19	2.74
Structural metal products	50.98	11.28	2.21	46.08	11.83
Other metal products	46.72	8.38	4.06	39.32	10.84
General purpose machinery	59.16	36.08	18.62	59.61	46.59
Special purpose machinery	59.59	55.89	54.77	80.39	73.46
Domestic appliances	76.56	43.51	38.81	79.87	45.53
Office & computing machinery	76.47	66.23	57.92	76.63	76.41
Electric motors, etc.	46.83	18.05	10.55	72.10	17.41
Electricity distribution machinery	84.86	43.09	33.42	88.41	87.57
Insulated wire & cable	53.48	28.07	23.60	25.76	4.39
Batteries, etc.	69.18	57.39	7.23	82.23	57.97
Electric lamps	39.65	19.80	17.84	66.97	34.04
Other electrical machinery	61.25	21.73	6.13	71.04	25.29
Electronic components	84.03	67.26	47.19	84.87	80.19
Radio & TV transmitters, etc.	69.08	66.69	54.03	77.27	74.78
Radio & TV receivers, etc.	79.71	57.61	51.49	80.09	67.69
Medical machinery	49.55	36.45	0.00	66.74	54.89
Optical & photographic machinery	86.22	84.73	80.88	93.13	90.95
Watches & clocks	76.36	74.72	57.07	80.77	80.77
Motor vehicle assembly, etc.	95.84	15.21	1.09	96.33	0.00
Motor vehicle bodies, trailers, etc.	61.15	12.01	0.00	53.14	1.15
Motor vehicle parts	33.05	7.63	0.27	38.41	12.16
Other transportation machinery	46.86	2.26	0.66	50.08	4.44
Furniture	22.77	8.29	3.45	53.65	38.09
Jewelry	42.28	20.26	11.12	79.12	76.90
Miscellaneous manufacturing	46.65	37.95	6.61	68.47	60.54

Appendix Table 6 (continued)

Industry	Foreign MNCs			Exporters	
	All	Majority	Wholly	All	Majority
Omitted industries	3.42	0.53	0.41	27.08	2.41
Tobacco	6.35	1.31	1.31	116.05	8.16
Fur products	0.96	0.60	0.30	1.30	1.30
Recorded media	0.39	0.00	0.00	0.49	0.01
Coke oven products	166.40	0.00	0.00	0.00	0.00
Nuclear fuel processing	0.00	0.00	0.00	0.00	0.00
Ships & boats	3.83	0.00	0.00	7.05	1.72
Railway	na	na	na	na	na
Aircraft & spacecraft	0.00	0.00	0.00	1.06	1.06

Sources: authors' compilations of plant-level data underlying National Statistical Office (1999).

Appendix Table 7: Alternative Estimates of Entry Barriers in 1996 and Market Growth 1996-2006
(AKC & MES in million baht, GMS in percent)

Industry	NSO		NESDB	Large Firms		
	AKC	MES	GMS	AKC	MES	GMS
Manufacturing (AKC, MES=means)	2,602.11	5,973.12	113.06	3,982.02	9,130.60	165.03
Meat products	678.65	1,780.17	39.24	1,651.00	4,098.75	125.45
Fish products	395.78	2,396.33	63.61	661.88	3,866.50	95.01
Fruit & vegetable products	403.05	3,371.64	93.26	838.60	2,210.30	67.30
Dairy products	515.38	1,120.75	165.61	1,396.00	5,633.00	261.30
Grain mill products	371.92	2,157.69	105.13	1,866.00	5,472.00	92.11
Starches, animal feeds	289.90	2,325.11	11.63	8,285.00	41,285.00	101.70
Other food products	1,344.35	2,608.06	66.32	1,766.14	3,449.29	61.21
Beverages	5,980.00	18,146.33	140.35	5,188.00	28,402.67	31.33
Textiles spinning & weaving	2,250.47	2,292.73	32.86	3,748.80	6,089.20	32.39
Other textiles	1,216.53	3,609.40	32.32	1,414.80	1,268.20	65.10
Knitted fabrics	225.09	908.81	38.38	695.00	1,733.33	128.03
Apparel	196.08	836.94	30.03	466.83	1,910.83	93.00
Leather tanning & dressing	291.87	868.91	-7.05	390.00	804.60	18.13
Luggage, handbags, etc.	111.96	405.25	83.26	98.17	380.17	65.81
Footwear	374.86	1,183.57	17.38	1,505.00	2,679.50	60.45
Wood sawmilling & planing	132.00	364.45	-18.58	59.67	815.67	69.62
Other wood products	476.77	1,135.26	42.95	1,483.00	775.60	146.89
Paper products	1,739.69	16,143.00	111.35	15,858.00	10,646.00	123.76
Publishing	2,078.89	2,182.75	-1.52	1,173.33	1,515.00	43.70
Printing	449.54	10,107.50	148.37	1,790.25	1,701.50	81.25
Recorded media	61,428.00	62,391.50	329.02	28,575.50	62,349.50	317.76
Basic chemicals	5,584.00	8,063.00	117.48	30,966.33	12,573.00	782.35
Primary plastics' forms	9,697.33	5,860.33	371.43	7,615.00	4,132.25	536.76
Other chemical products	924.78	7,483.00	104.85	1,276.80	4,072.60	104.32
Synthetic fibers	3,997.83	3,399.00	na	4,076.50	5,881.50	157.98
Rubber tyres & tubes	2,639.13	4,943.67	180.58	6,736.00	9,904.00	160.21
Other rubber products	195.98	3,697.57	189.04	585.25	7,869.25	246.12
Plastic products	539.76	991.35	193.23	1,994.00	2,184.67	110.19
Glass products	1,807.25	1,911.25	99.04	4,459.00	7,321.50	16.07
Non-metallic mineral products	2,403.28	2,964.56	52.81	29,348.50	32,320.50	21.86
Ferrous metals	582.67	2,920.10	6.72	6,687.60	7,424.00	177.84
Non-ferrous metals	362.85	811.40	474.58	1,056.20	2,083.80	381.94
Metals' casting	1,071.53	2,151.33	na	850.50	1,107.00	353.38
Structural metal products	2,017.92	2,547.10	22.61	462.00	1,622.40	107.22
Other metal products	2,021.80	3,285.18	231.91	1,327.43	2,371.43	96.80
General purpose machinery	1,632.26	2,804.80	226.77	2,683.75	6,546.00	133.97
Special purpose machinery	9,950.00	23,621.00	12.14	566.50	4,464.00	144.59
Domestic appliances	2,034.00	7,323.67	91.95	3,077.00	8,532.67	99.43
Office & computing machinery	747.54	13,089.50	287.82	14,164.00	54,400.00	228.84
Electric motors, etc.	282.26	977.40	333.82	492.25	2,848.00	48.50
Electricity distribution machinery	2,252.67	12,954.00	na	965.00	1,574.33	494.32
Insulated wire & cable	1,113.23	1,643.50	149.75	1,698.00	3,954.00	102.67
Batteries, etc.	147.66	1,670.00	78.22	725.00	1,189.50	163.52
Electric lamps	236.31	358.60	173.98	880.50	3,669.00	55.89
Other electrical machinery	1,283.88	3,534.80	157.14	1,180.25	3,732.00	54.19
Electronic components	2,377.60	5,098.33	215.43	5,961.80	16,886.40	142.60
Radio & TV transmitters, etc.	1,008.51	3,472.00	na	627.50	5,757.00	63.32
Radio & TV receivers, etc.	1,288.51	7,196.50	9.88	1,387.00	7,962.00	147.95
Medical machinery	326.13	567.89	7.81	996.00	1,636.50	165.67
Optical & photographic machinery	784.00	7,986.00	310.83	605.00	1,145.33	653.79
Watches & clocks	734.05	1,393.00	-4.90	372.33	1,743.33	71.93
Motor vehicle assembly, etc.	5,149.50	49,215.75	160.19	9,357.50	57,103.00	142.83
Motor vehicle bodies, trailers, etc.	2,651.00	9,106.67	32.21	615.33	1,460.67	177.15
Motor vehicle parts	1,070.55	2,642.56	608.56	2,677.00	9,177.00	179.92
Other transportation machinery	287.97	1,033.89	79.21	2,510.00	28,922.00	177.08
Furniture	167.57	591.01	7.70	788.40	1,376.60	79.30
Jewelry	71.57	1,182.56	76.35	358.50	1,254.25	440.30
Miscellaneous manufacturing	528.55	1,612.48	76.29	1,916.50	16,287.00	108.16

Appendix Table 7 (continued)

Industry	Industry-wide			Large Firms		
	AKC	MES	GMS	AKC	MES	GMS
Omitted industries	4,259.79	35,200.40	17.20	1,352.33	2,552.67	179.92
Tobacco	3,114.00	31,712.00	7.88	36.33	295.33	168.04
Fur products	126.63	291.59	na	47.00	34.00	749.91
Recorded media	40.69	187.60	na	565.00	1,801.00	105.46
Coke oven products	625.72	1,469.00	na	2.00	133.00	499.52
Nuclear fuel processing	325.60	121.05	na	na	na	na
Ships & boats	11.55	1,372.00	27.59	702.00	289.33	226.86
Railway	3.97	10.30	24.19	na	na	14,138.31
Aircraft & spacecraft	11.63	36.86	na	na	na	na

Sources: compiled from the authors' large-firm database (see Appendix A for detailed description and sources).

Appendix Table 8: Industry Definitions by TSIC (Thai Standard Industrial Classification), revision 3

Industries included in the analysis		Industries omitted from the analysis	
Verbal Definition	TSIC(=ISIC) Definition	Verbal Definition	SIC(=ISIC) Definition
Manufacturing (subtotal of below)	D less omitted industries	Omitted industries	na
Meat products	1511	Tobacco	160
Fish products	1512	Fur products	182
Fruit & vegetable products	1513+1514	Recorded media	223
Dairy products	152	Coke oven products	231
Grain mill products	1531	Nuclear fuel processing	233
Starches, animal feeds	1532+1533	Ships & boats	351
Other food products	154	Railway	352
Beverages	155	Aircraft & spacecraft	353
Textiles spinning & weaving	171		
Other textiles	172		
Knitted fabrics	173		
Apparel	181		
Leather tanning & dressing	1911		
Luggage, handbags, etc.	1912		
Footwear	192		
Wood sawmilling & planing	201		
Other wood products	202		
Paper products	210		
Publishing	221		
Printing	222		
Recorded media	232		
Basic chemicals	2411+2412		
Primary plastics' forms	2413		
Other chemical products	242		
Synthetic fibers	243		
Rubber tyres & tubes	2511		
Other rubber products	2519		
Plastic products	252		
Glass products	261		
Non-metallic mineral products	269		
Ferrous metals	271		
Non-ferrous metals	272		
Metals' casting	273		
Structural metal products	281		
Other metal products	289		
General purpose machinery	291		
Special purpose machinery	292		
Domestic appliances	293		
Office & computing machinery	300		
Electric motors, etc.	311		
Electricity distribution machinery	312		
Insulated wire & cable	313		
Batteries, etc.	314		
Electric lamps	315		
Other electrical machinery	319		
Electronic components	321		
Radio & TV transmitters, etc.	322		
Radio & TV receivers, etc.	323		
Medical machinery	331		
Optical & photographic machinery	332		
Watches & clocks	333		
Motor vehicle assembly, etc.	341		
Motor vehicle bodies, trailers, etc.	342		
Motor vehicle parts	343		
Other transportation machinery	359		
Furniture	361		
Jewelry	3691		
Miscellaneous manufacturing	3692+3693+3694+3699		

Note: At this level of aggregation the TSIC is identical to the International Standard Industrial Classification (ISIC)