COMPETING AT HOME TO WIN ABROAD: EVIDENCE FROM JAPANESE INDUSTRY

Mariko Sakakibara and Michael E. Porter*

Abstract—The study explores the influence of domestic competition on international trade performance, using data from a broad sample of Japanese industries. Domestic rivalry is measured directly using market-share instability rather than employing structural variables such as seller concentration. We find robust evidence that domestic rivalry has a positive and significant relationship with trade performance measured by world export share, particularly when R&D intensity reveals opportunities for dynamic improvement and innovation. Conversely, trade protection reduces export performance. These findings support the view that local competition—not monopoly, collusion, or a sheltered home market—pressures dynamic improvement that leads to international competitiveness.

I. Introduction

This study explores the influence of domestic competition on international trade performance, using data from a broad sample of Japanese industries. The role of domestic rivalry in international competitiveness is highly salient at a time when the globalization of markets has raised questions about the appropriateness of domestic antitrust policy and other forms of domestic policy towards competition. Japan is a particularly interesting setting in which to explore this question because it is frequently argued that competition within Japan is limited. Many Western observers, for example, have asserted that Japanese industry is internationally competitive because of cooperation among Japanese rivals, sheltering from international competition, and selective intervention in competition orchestrated by the Ministry of International Trade and Industry (MITI) and other governmental agencies.[1] Related to this, a persistent theme in explaining Japanese competitiveness has been the role of benign antitrust laws and weak antitrust enforcement, under which even cartels are legal in many circumstances. It is argued that this fosters efficiency and avoids the "destructive" competition ascribed to Western industries.[2]

We explore three competing hypotheses about the effect of domestic competition on international market performance. The first, consistent with much literature on Japan, is that local collusion and limits on domestic competition enhance international competitiveness; here, the relation between the intensity of local rivalry and international competition is negative. Support for this hypothesis can be drawn from the literatures of trade and innovation. When there are impediments to trade such as tariffs, transport costs, and transaction costs that allow domestic firms to price-discriminate between domestic and foreign markets, and domestic and foreign products are perfect substitutes, firms face a more elastic demand for exports than for domestic sales. The domestic price will be higher than the export price. Domestic collusion, then, will be associated with higher exports (Caves & Jones, 1973; Brander, 1981; Brander & Krugman, 1983).

Consistent with this view is a long line of argument suggesting that monopolists will be more innovative than firms facing competition. Schumpeter (1943) argued that monopolies are a necessary evil for expanding R&D, because there are economies of scale in R&D, market power allows monopolists to fund more R&D, and large firms are willing to take greater risks. Concentrated domestic industries, then, would be associated with more innovation and enhanced international competitiveness.

A second hypothesis is that the intensity of domestic competition will have little or no association with international competitiveness because the distinction between domestic and international competition has been rendered unimportant by the widespread internationalization of markets. Reich (1991), for example, argued that the national identity of corporations and their homebase location has become increasingly irrelevant in international competition. The intensity of rivalry internationally is what is important, not domestic competition in any one country. This same school of thought leads to the conclusion that domestic antitrust policy in international industries need not concern itself with conditions in the local market.

A third and final hypothesis is that there should be a strong positive association between domestic rivalry and international competitiveness. This hypothesis draws on Porter (1990), who argues that domestic rivalry pressures firms to innovate and upgrade while fostering positive static and dynamic externalities in the local business environment (such as, supplier availability, easier access to technology and market information, and specialized human resource development).[3] In this theory, rivalry among domestically based firms offers greater benefits to competitive upgrading than either imports or foreign companies with minimal

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* University of California–Los Angeles and Harvard Business School, respectively.

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[1] An extreme version of this line of argument can be seen in literature by the so-called Revisionist School, notably by Johnson (1982), Fallows (1989), Prestowitz (1988), and van Wolferen (1989).

[2] In policy discussions, some have argued for a suspension of antitrust enforcement lest U.S. firms be handicapped in their competition with global rivals (Mueller, 1991).

[3] The nature of these externalities is further developed by Porter (1998a).

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investment in the nation. Local rivalry not only gives rise to positive externalities, but it creates stronger competitive incentives together with greater pressures to upgrade productivity, because local rivals neutralize advantages due to input costs and other local business conditions.[4] The literature on the economics of innovation contains theoretical support for the idea that competition is associated with greater rates of innovation under the assumption of strong ex post appropriability (Arrow, 1962; Loury, 1979; Lee & Wilde, 1980). In the same vein, Scherer (1980) argued that insulation from competitive pressures breeds bureaucratic inertia and discourages innovation. Porter's theory also builds on a tradition going back to another argument advanced by Schumpeter (1934, 1943), which sees competition as a dynamic process of creating new products and process. Here, dynamic domestic competition would spur innovation and productivity improvement and, in turn, international competitiveness.

This study explores these three competing hypotheses by examining the effect of domestic competition on the trade performance using new data on a broad sample of Japanese industries. We employ market-share instability in the Japanese market to measure domestic rivalry directly, rather than using structural variables such as seller concentration to proxy the intensity of competition. We also investigate the relative influence of market-share instability, import penetration, and domestic protection as influences on trade performance. Section II reviews the relevant literature. Section III introduces the statistical model and variables. The data are described in section IV. Section V presents our empirical results, and section VI offers some conclusions.

II. Empirical Evidence on the Link between Domestic Rivalry and Export Performance

Although a good deal of empirical literature examines the connection between international trade and domestic market structure, it has mainly focused on the role of international trade in influencing industry profitability. Leading examples include Pugel (1980), Yamawaki (1986), and Patterson and Abbott (1994).

Empirical studies of the relationship between domestic rivalry and export performance have been few, and they report conflicting findings. On the one hand, Pagoulatos' and Sorensen's 1976 analysis of 88 three-digit SITC industries found that the U.S. seller-concentration ratio was positively related to U.S. industry exports as a percentage of OECD exports. They argue that, when barriers to trade are present, firms possessing market power in their domestic market will have greater exports because they can engage in dumping and because control over the domestic market may allow more-aggressive pursuit of export opportunities.

[4] Note that a domestically based rival can be foreign or domestically owned.

Yamawaki and Audretsch (1988), on the other hand, found that four-firm producer concentration had a negative and significant effect on the Japanese share of all exports to the U.S. markets in a small sample of 24 three-digit SIC Japanese industries. In a highly concentrated domestic industry in which the interdependence among firms is well recognized, firms will have lower level of pre-trade output and higher prices, reducing export competitiveness. Yamawaki and Audretsch also found that high concentration of the Japanese relative to the U.S. industry had a negative and significant effect on Japanese exports to the United States, consistent with the above argument. Note that Yamawaki and Audretsch's dependent variable is a measure of bilateral trade and not overall trade performance.

Audretsch and Yamawaki (1988), in a study of 213 four-digit SIC industries, also found that domestic seller concentration had a negative influence on U.S.-Japan bilateral trade performance, and that legal cartelization status had no significant effect on bilateral trade. They also found that relative R&D intensity between the United States and Japan had a positive and significant impact on the trade balance. If more-intense domestic competition leads to higher relative R&D intensity, these results would be consistent.[5]

III. Specification

In these and virtually all studies of the relationship between competition and trade, the extent of competition is proxied by the industry concentration ratio. Our approach is to measure rivalry (market conduct) directly using market-share instability and relate it to trade performance, controlling for factor endowments. We also explore the role of import protection and other variables on trade performance.

Although our argument is that market-share instability reflects the intensity of competition, another possibility is that share instability is the result of exogenous disturbances. We thus estimate two models: a market-share instability model and a trade-performance model. By including exogenous shocks among the explanatory variables in the first model, we evaluate their importance in explaining share instability. The second trade-performance model is our primary interest. We also test the possibility that market-share instability and trade performance are simultaneously determined by employing two-stage least-square (2SLS) estimation.

[5] Nolle (1991) finds that domestic concentration is associated with lower export intensity. There are also a few studies that deal with the effect of a change in domestic market structure on trade performance. Pickering and Sheldon (1984) found, in an analysis of 97 three-digit British manufacturing industries, that increasing domestic concentration between 1963 and 1971 is closely associated with a decline in net trade performance (export − import)/(export + import) over the 1971–1977 period.

A. Model 1

$$MSINST = a + b_1 R\&D + b_2 ADV + b_3 C4 + b_4 C4SQ + b_5 PCAP + b_6 SHIPGRW + b_7 SHIPVAR + b_8 JIS + b_9 BARRIERS72 + b_{10} CARTEL + b_{11} EXCARTEL + \epsilon \quad (1)$$

Dependent variable

Market-Share Instability: Following Caves and Porter (1978), we calculate market-share instability from the sum of individual market-share fluctuations of leading firms between 1973 and 1990. Measures of market structure, such as the number of firms, the four-firm industry concentration ratio, and the Herfindahl index only indirectly measure market conduct. In contrast, there are strong theoretical reasons that instability in market positions is a sign of active competition, whereas stable market shares will be associated with oligopolistic collusion. Stigler (1964) noted that fixing market shares is probably the most efficient of all methods of combating secret price reductions, and Shepherd (1970) observed that successful collusion will tend to hold market shares virtually constant. Allen (1976) also noted that, under conditions of imperfect collusion, temporarily stable market shares are probably the best that can be attained. Although constant market shares can also stem from vigorous but stalemated competition, such a running standoff is relatively improbable. The greater the stability of shares, then, the higher the likelihood that overt cooperation or strong recognition of mutual dependence is present; conversely, churning among market shares, especially that of leading firms, should be associated with active competition whatever the level of concentration.[6]

We calculate market-share instability in two ways (appendix A provides the details). One is *absolute instability,* or the sum of the absolute value of the annual percentage-point changes in market share over time. The other is *relative instability,* which is the sum of the absolute values of the annual percentage-point change in share divided by, or multiplied by, the initial share. We calculate these two indices for the top two, three, four, and all major industry competitors reported in the dataset. The top *n* firms are selected in two ways: one is to select top *n* firms in each year and measure the market-share change from the previous year for each of these firms; the other is to select top *n* firms from the ranking of average market shares over the eighteen-year period, and calculate market-share changes of these particular *n* firms. These allow us to explore what pattern of share changes among what set of rivals best captures the effective level of competition in an industry.

Absolute and relative instability involve different assumptions about the share changes in rivalry. Absolute instability assumes that a given point change of market shares carries equal significance for competition regardless of the firm size. Relative instability assumes that proportional market-share changes are a better indication of shifts in competitive position. We explore different ways of computing relative stability allow different weightings of the share changes of large and smaller firms.[7]

Control variables

Model 1 includes variables that potentially affect market-share instability. Caves and Porter (1978) provide a framework consisting of four types of influences: types of nonprice rivalry, market structure, structural dampening, and exogenous disturbances. Our central concern is market-share instability caused by the presence of competition or the breakdown of collusive agreements, not that caused by exogenous disturbances not connected with rivalry. We explore both "passive" competition (which results from the breakdown of oligopolistic collusion) and "active" competition (which reflects competitive attempts to outperform rivals).[8] In the Japanese context, we also include a number of variables measuring the existence of a cartel in the industry, which may act to limit rivalry and stabilize shares. Table 1 provides variable definition, means, and standard derivations.

Nonprice Rivalry: Active competition on R&D and marketing enlarges the scope for market disturbances, but the resulting product differentiation acts as an insulator of shares by reducing the expected size of share displacements. Thus, it is safe to assume the presence of opportunities for repeated nonprice competition to destabilize market shares in an analysis encompassing an eighteen-year period. Nonprice rivalry variables also have a passive impact on market shares, because collusive agreements are prone to be less complete and less

[6] Market-share instability has sometimes been measured using changes in the four-firm concentration ratio (Lynk, 1981; Eckard, 1987). This approach, however, yields an imperfect measure of rivalry, because the four-firm concentration ratio can remain stable even if there are frequent changes in rank and share among the leading firms, a result verified by Davies and Geroski (1997). Turnover, or change in rank among the leading firms, has also been widely used as a measure of competition (studies include Joskow, 1960; Hymer and Pashigian, 1962; Gort, 1963; Heggestad and Rhoades, 1976). However, turnover is sensitive to the dispersion of firm sizes within a market. An industry in which many firms are concentrated in one size class could exhibit high turnover simply as the result of random differences in firm growth rates irrespective of the degree of competition (Hymer and Pashigian, 1962). See also Shaffer (1986). Finally, it might be argued that entry and exit rates would be more accurate measures of rivalry than market-share fluctuations among leading firms. A number of studies, however, suggest the contrary. Baldwin (1995), for example, finds that market-share changes due to the growth and decline of incumbents dominate changes in share due to entry and exit.

[7] One measure of relative instability, the sum of the absolute value of the annual percentage-point changes divided by the initial share, discounts the impact of market-share changes of large firms. Another relative instability measure, the sum of the absolute value of the annual percentage-point changes multiplied by the initial share, give more weight to the market-share changes of larger firms under the assumption that the competitive disruption of a share increase of the same percentage is greater for large firms than it is for small firms.

[8] Past studies have focused mostly on the stability induced by collusion.

TABLE 1.—VARIABLE DEFINITIONS, MEANS, AND STANDARD DEVIATIONS

Variable Name	Definition	Description	Mean	Standard Deviation
WES	World export share	Industry's share of world exports, average of 1991, 1992 and 1993	0.144	0.149
MSINST	Market-share instability, 1973 to 1990	Alternative measures:		
		top 2 firms, absolute instability, year-to-year basis	0.0200	0.00966
		top 3 firms, absolute instability, year-to-year basis	0.0187	0.00814
		top 4 firms, absolute instability, year-to-year basis	0.0180	0.00794
		all firms, absolute instability, year-to-year basis	0.0168	0.00714
		top 2 firms, relative instability(1), year-to-year basis	0.0798	0.0379
		top 2 firms, relative instability(2), year-to-year basis	0.00625	0.00422
LABOR	Unskilled labor share	Industry's average salary for workers under 17 years old (or 24 years old, whichever is available) * number of employees/value added, average of 1979 and 1987	0.000458	0.000341
HCAP	Human-capital share	(Industry's average salary − industry's average salary for workers under 17 (24) years old) * number of employees/value added, average of 1979 and 1987	0.172	0.0585
PCAP	Physical-capital intensity	Fixed assets/value added, average of 1979 and 1985	0.517	0.441
SCALE	Scale index	Percentage of employees in establishments with 200 or more employees, average of 1979 and 1987	0.522	0.259
MES	Minimum efficient scale	Average efficient plant size given by the average size of the largest plants accounting for 50% of industry shipments, divided by industry shipments. Average of 1979 and 1987	0.0467	0.0468
BARRIERS72	Tariff and nontariff barriers	Sum of Japanese average tariff rates in 1972 and a nontariff barrier index in 1970	0.136	0.105
BARRIERS	Tariff and nontariff barriers	Sum of Japanese average tariff rates and a nontariff barrier index. Average of 1972 (1970 for nontariff barriers) and 1993	0.0979	0.0916
R&D	R&D intensity	R&D expenditures/value added, average of 1975 and 1981	0.0600	0.0264
ADV	Advertising intensity	Purchased advertising/total output, average of 1975 and 1985	0.0226	0.0355
JIS	Japanese import share	Industry's share of world imports, average of 1988 to 1993.	0.0296	0.0286
C4	Four-firm concentration	Average four-firm concentration ratio, 1973 to 1990	0.743	0.156
SHIPGRW	Industry growth	Slope coefficient of log-linear regression of industry shipments on time, 1973 to 1990	0.0553	0.0573
SHIPVAR	Demand fluctuations	Average absolute value of percentage deviations from regressions of annual industry shipments on time, 1973 to 1990	0.208	0.249
CARTEL	Presence of a cartel other than an export-import cartel	Dummy variable equal to 1 if the industry is the subject of legal cartels except export import industry cartels at any point between 1973–1990: 0 otherwise	0.182	0.388
EXCARTEL	Presence of an export-import cartel	Dummy variable equal to 1 if the industry is the subject of export-import industry cartels at any point between 1973–1990; 0 otherwise	0.195	0.399
ALLCARTEL	Presence of any cartel	Dummy variable equal to 1 if the industry is the subject of legal cartels at any point between 1973–1990; 0 otherwise	0.260	0.441

effective in dealing with nonprice than price competition. We include R&D intensity (*R&D*) and advertising intensity (*ADV*) in the model and expect a positive relation of these variables to market-share instability.

Market Structure: Market structure measured by seller concentration has been most central to discussions of rivalry. A nonlinear relationship between concentration and instability is expected, with instability rising and then falling as concentration increases from very low to very high levels. Market shares should be stable at low levels of concentration because there is nearly pure competition and hence no mutual agreements to be violated. Stability should fall as concentration rises from low to moderate as firms' behavior deviates from pure competition. A highly concentrated industry, however, is better able to achieve effective collusion, and, hence, the stability of shares should rise. We include four-firm concentration ($C4$), and concentration squared in the analysis. Although $C4$ in our sample ranges from 29.9% to 100%, the industries included are relatively concentrated, with an average $C4$ of 74.2%.[9] We expect a negative relation between $C4$ and market-share instability.

[9] High average concentration results in a high correlation between $C4$ and $C4$ squared in our sample, so that the results of $C4$ squared are not reported.

Structural Dampening: Industry structure can affect the speed of market-share adjustments. For example, the speed with which capacity can be adjusted, which we proxy with capital intensity, modulates market-share changes due to disturbances. We expect a negative relation between physical-capital intensity (*PCAP*) and market-share instability.

Exogenous Disturbances: Exogenous disturbances such as demand variations and production-cost changes can shift equilibrium market shares. Such disturbances can have asymmetrical influences on firms and provoke asymmetrical behavior, with corresponding market-share changes. Even if a tacit oligopolistic agreement exists before a disturbance occurs, oligopolistic consensus may break down in the process of adjusting competitive variables other than market share to the new equilibrium, triggering rivalrous behavior. To control for exogenous disturbances, we include industry growth (*SHIPGRW*) and industry demand fluctuations (*SHIPVAR*), and expect the relationship with market-share instability to be positive.

Import Pressure: Another potential of exogenous disturbance is competition from imports, which could destabilize market shares. We employ Japan's share of world imports in an industry (*JIS*) as a proxy for import competition. (Data on imports as a share of Japanese sales or production is unavailable.) The presence of trade barriers will insulate the domestic market from outside pressure and tend to stabilize market share. We include a measure of tariff and nontariff barriers in 1972 (*BARRIERS72*). We expect a positive relation between Japanese import share and market-share instability, and a negative relation between trade barriers and market-share instability.

Presence of Cartels: Given the Japanese context, we also include variables measuring the presence of legal cartels. Four major types of cartels are allowed under Japanese antimonopoly law: recession cartels, rationalization cartels, small- and medium-sized company cartels, and export-import cartels. Industry-specific cartels have also been permitted through special laws to achieve industry-specific objectives. Legal cartels permit companies to agree on such things as production levels, prices, capacity expansion, cost reduction, and industry standards.

We distinguish export-import cartels from other types of cartels because, in practice, they have not necessarily restricted or tempered domestic competition. In the 1950s and 1960s, export-import cartels were used primarily as a regulatory mechanism for setting minimum export quantities to qualify for a foreign-exchange allocation. After 1969, such cartels were mainly used to implement government-negotiated voluntary export restraints.[10] We examine the effect of all cartels (*ALLCARTEL*) and also separately examine the influence of export-import cartels (*EXCARTEL*) and non export-import cartels (*CARTEL*). We expect a negative relation between the presence of cartels and market-share instability except in the case of export-import cartels, where we do not have a clear prior.

B. Model 2

$$WES = a + \beta_1 MSINST + \sum_{i=1}^{m} g_i FE_i + \beta_2 BARRIERS72 + \beta_3 SCALE(orMES) + e \quad (2)$$

Dependent variable

World Export Share: In model 2, the dependent variable is world export share (*WES*) or the share of a Japanese industry's exports of total world exports, averaged over 1991–1993.[11] We examine world export share at the end of the period as a function of independent variables measured in earlier years. Table 1 contains variable definitions, mean, and standard deviations.[12]

Control variables

Market Share Instability: We expect a positive relationship between market-share instability and the world export share.

Factor Endowments: Factor endowments (FE_i) are included as control variables, following the extensive literature on the influence of factor endowments on trade (such as Urata (1983), Yamawaki and Audretsch (1988), Audretsch and Yamawaki (1988), and Balassa and Noland (1989)).[13] We include the relative shares of unskilled labor (*LABOR*), physical capital (*PCAP*), and human capital (*HCAP*), in

[10] Dick (1992) found that Japan's export cartels have not materially affected either export prices or volumes in most industries.

[11] Other measures of trade performance used in the previous studies include the net export index $(X - M)/(X + M)$, where X is export and M is import of an industry. An advantage of world export share index, as opposed to other measures, is that it reflects the relative growth of the world trade and a country's export (Markusen, 1992). Another advantage of world export share over net exports is that the scaling of net exports by world market size corrects for possible heteroskedasticity (Deardorff, 1984).

[12] International competitiveness can also be manifested by outbound foreign direct investment, although empirical studies find a complementary relationship between exports and foreign direct investment. See, for example, Lipsey and Weiss (1981), Swedenborg (1979), and Grubert and Mutti (1991). Because disaggregated foreign direct investment data is unavailable, we employ export share as a proxy for industry competitiveness.

[13] Leamer and Bowen (1981) have demonstrated that regressions of trade on factor-intensity variables based on the Heckscher-Ohlin factor abundance theorem may yield misleading inferences in the absence of data on factor endowments in a multifactor model. Their argument is based on the general equilibrium setting, which is not the case in the empirical study of a country's trade performance which is inevitably partial-equilibrium in nature. Here, we do not test the Heckscher-Ohlin theorem directly, but select trade variables consistent with the Heckscher-Ohlin theorem. (For a related discussion, see Deardorff (1984).)

value added in the model. Following the literature, we expect a negative relationship between unskilled labor share and world export share, and a positive relationship between human-capital share and physical-capital intensity and world export share.

Protection of the Domestic Market: Protecting the domestic market via tariff and nontariff barriers may reduce the motivation of domestic firms to upgrade productivity, reducing exports. This argument, consistent with our hypothesis about the positive influence of market-share instability, would suggest a direct influence of trade protection on export performance. An alternative argument is that domestic market protection allows domestic firms to earn higher rents that can be used to subsidize exports, so that greater industry protection will be associated with higher exports. We test these competing hypotheses by including a measure of tariff and nontariff barriers in 1972 (*BARRIERS72*). We also test an average of this measure of barriers in 1972 and a comparable measure in 1993. Note that trade barriers may also be subject to endogeneity; industry uncompetitiveness may lead to higher trade barriers.

Scale Economies: It has been argued that the size of the home market may give large nations (such as Japan) an export advantage in industries in which scale economies are important (Linder, 1961; Ohlin, 1967; Hufbauer, 1970). However, Porter (1990) argues that home market size may have lost its importance as international markets are increasingly open and firms compete via international marketing networks. He suggests that home market characteristics that support rapid innovation, rather than size per se, may be the principal influence of home demand on export competitiveness. We examine two measures of scale economies: the scale index (*SCALE*) and the minimum efficient scale index (*MES*). Alternative theories suggest a positive or a nonsignificant relationship between scale economies and world export share.

Strategic Variables: We also explore the independent effect of the strategic variables on trade performance. High R&D intensity reveals both the potential for technological competition and that companies are competing on new products and processes. We expect a positive relationship between R&D intensity (*R&D*) and trade performance, which has been revealed in previous studies. We also included a variable that interacts R&D intensity and market-share instability, based on the hypothesis that vigorous rivalry will have a greater positive effect on trade performance where high R&D intensity reveals the presence of innovation-based competition.

Other Variables: We also explored the independent effect of cartels and the extent of imports into Japan on trade performance. Cartels are expected to reduce the intensity of rivalry manifested in market-share instability, but may suppress competition in other ways. We expect a negative relation between the presence of cartels and trade performance. Imports may also enhance competitive pressure beyond what is reflected in the market-share instability measure, and we test import share (JIS) in the trade performance equation as well.

IV. Data

Market-share data between 1973 to 1990 were collected from the *Market Share Encyclopedia*, which covers several hundred Japanese industrial and consumer goods.[14] The construction of the sample involved matching the available data on market shares, export performance, and other industry characteristics in terms of time period and level of aggregation. This matching procedure resulted in a sample of 77 products where we were able to obtain a market-share time series over an eighteen-year period. The sample included 46 industrial goods and 31 consumer goods. Among them, 37 were above the average Japanese world export share (10.4% in 1992) and 40 were below this cutoff.

The *Market Share Encyclopedia* includes data on the Japanese market shares of the top three to eight companies, as well as total Japanese market size. The sum of the market shares of the listed companies typically comprises approximately 80% of the total market, although it ranges from 40% to 100%. Market shares held by nonlisted companies are grouped in "others."[15]

Both domestic companies and foreign companies such as Otis Japan and Nestle are included in the rankings, although the number of foreign firms in the sample is small.[16] We treat domestic firms and foreign firms with operations in Japan equally, under the assumption that most of the listed foreign firms have full production operations in Japan and can be considered locally based participants in Japanese domestic rivalry. Data availability does not allow a direct test of the effect of import competition on domestic rivalry, but an indirect test is reported on.

Our data is subject to certain limitations. Because the data covers only the market-share fluctuations of the larger firms, it does not completely measure entry and exit. When a new company appears in the data, we cannot distinguish a newly entered firm from one that has been omitted from previous data or has just attained a share large enough to enter the rankings. When a company disappears from the data, we

[14] *Market Share Encyclopedia,* Yano Research Institute, Tokyo, Japan, various years.

[15] The measure of market share varies. The majority of shares are based on Yen value, either of production or shipment/sales. Some shares are based on unit volume. In nineteen industries, the unit of measurement changed over time. In these cases, we calculated market shares by using the available measure, assuming the same relationship holds in across different measures.

[16] Only eleven wholly owned Japanese subsidiaries of foreign firms and eight joint ventures (including Fuji Xerox and Caterpillar Mitsubishi) are included in the data out of a total population of 461 firms.

TABLE 2.—MODEL 1: DEPENDENT VARIABLE: MARKET-SHARE INSTABILITY

Panel 1: Market-share instability measure: Absolute instability

	Top Firms Share on Year to Year Basis				Top Firms Share by Average		
	$N = 2$	$N = 3$	$N = 4$	$N = all$	$N = 2$	$N = 3$	$N = 4$
R&D	0.029	0.037	0.034	0.028	0.043	0.042	0.046
	(0.507)	(0.806)	(0.753)	(0.708)	(0.716)	(0.822)	(0.986)
ADV	−0.067	−0.065	−0.059	−0.057	−0.082	−0.070	−0.067
	(−1.828)*	(−2.220)**	(−2.063)**	(−2.279)**	(−2.150)**	(−2.192)**	(−2.270)**
C4	0.016	0.015	0.012	0.014	0.015	0.012	0.011
	(2.102)**	(2.577)**	(2.153)**	(2.673)***	(1.913)*	(1.915)*	(1.806)*
PCAP	−0.0017	−0.0019	−0.0021	−0.0020	−0.0030	−0.0028	−0.0023
	(−0.584)	(−0.819)	(−0.899)	(−0.972)	(−0.969)	(−1.069)	(−0.977)
SHIPGRW	0.0027	0.0089	0.0074	0.0055	0.010	0.011	0.0093
	(0.111)	(0.463)	(0.391)	(0.334)	(0.407)	(0.533)	(0.480)
SHIPVAR	0.0053	0.0060	0.0064	0.0059	0.0061	0.0057	0.0059
	(1.106)	(1.551)	(1.687)*	(1.779)*	(1.211)	(1.351)	(1.523)
BARRIERS72	0.0077	0.0039	0.0036	0.0058	0.0082	0.0045	0.0072
	(0.596)	(0.378)	(0.353)	(0.646)	(0.604)	(0.393)	(0.687)
CARTEL	−0.0026	−0.0035	−0.0039	−0.0041	−0.0036	−0.0033	−0.0029
	(−0.735)	(−1.257)	(−1.401)	(−1.707)*	(−0.974)	(−1.082)	(−1.021)
EXCARTEL	0.0041	0.0047	0.0046	0.0045	0.0065	0.0053	0.0045
	(1.174)	(1.679)*	(1.700)*	(1.886)*	(1.784)*	(1.756)*	(1.601)
Constant	0.0065	0.0051	0.0067	0.0050	0.0082	0.0083	0.0075
	(0.983)	(0.978)	(1.307)	(1.100)	(1.202)	(1.452)	(1.416)
R^2	0.145	0.236	0.222	0.261	0.189	0.210	0.214
Adj. R^2	0.030	0.134	0.117	0.162	0.080	0.104	0.109
DF	67	67	67	67	67	67	67

The number of observations: 77.
T-statistics in parentheses.
*** significant at the 1% level. ** significant at the 5% level. * significant at the 10% level, using a two-tailed *t*-test.

cannot distinguish exit from the case of market share falling below the reported threshold.[17] Despite this, there are reasons to believe that market-share changes of leaders are a better proxy for the intensity of rivalry than the market-share fluctuations of smaller competitors.

Most turnover studies, including the comprehensive study by Baldwin (1995), employ the four-digit SIC level. This level of aggregation sometimes combines more than one distinct industry. Our data addresses approximately the five- to six-digit SIC level. Another advantage of our sample is its time period. An eighteen-year period allows a more robust measure of the intensity of competition over several business cycles, compared to most turnover studies which cover a much shorter time period or examine share changes between just two endpoints. Because significant gains and losses in international market position can require a decade or more, our ability to observe industry rivalry over a long time period contributes to our ability to draw a meaningful inference about the effect of domestic rivalry on trade performance. We can also employ lagged independent variables to better distinguish cause and effect.

We averaged world export share over a three-year period to dampen random disturbances. Export share was measured at the end of the period to introduce a time lag between the trade performance and the period over which market-share fluctuations are measured. Other data sources are explained in appendix B.

A correlation matrix of all the variables is presented in appendix C. The correlation matrix reveals a high correlation between the world export share variables and all the market-share instability measures. R&D is also highly positively correlated with world export share, but only weakly correlated with market-share instability. Protection is highly negatively correlated with world export share, and highly negatively correlated with R&D intensity.

V. Results

Regressions were estimated using ordinary least squares. Tables 2 and 3 report the results.

A. *Model 1*

The results of estimations of the market-share instability model are shown in table 2, which reports the results using measures of absolute market-share instability as the dependent variable. High industry concentration is positively associated with market-share fluctuations, contrary to the predictions of the literature on the influence of concentration. Our results are consistent with Sutton's (1991) argument. When firms have an opportunity for nonprice competition such as in R&D, rivalry can escalate in a concentrated industry. Another nonprice competition variable, *ADV*, proved to be significant with a

[17] Over the eighteen years of observation, there are some cases in which new companies enter the rankings and replace previously listed ones. Of our 77 industries, 62 experienced the advent of new companies that survived for at least five years. When a new firm appears in the data, market-share instability measures are calculated from the second year of its appearance because, otherwise, we have to assume the market share of the year before the first appearance to be zero, giving the market-share instability measure an upward bias.

TABLE 3.—MODEL 2: DEPENDENT VARIABLE: WES

Panel 1: Market-share instability measure: Absolute instability

	Top Firms Share on Year to Year Basis				Top Firms Share by Average		
	$N = 2$	$N = 3$	$N = 4$	$N = all$	$N = 2$	$N = 3$	$N = 4$
MSINST	6.249	7.692	6.785	7.284	6.004	6.641	7.149
	(3.936)***	(4.127)***	(3.417)***	(3.259)***	(4.025)***	(3.735)***	(3.702)***
LABOR	−81.667	−91.260	−90.513	−99.464	−85.505	−83.884	−89.814
	(−1.741)*	(−1.955)*	(−1.877)*	(−2.031)**	(−1.828)*	(−1.770)*	(−1.887)*
HCAP	0.370	0.403	0.390	0.407	0.310	0.365	0.363
	(1.134)	(1.252)	(1.171)	(1.213)	(0.948)	(1.107)	(1.100)
PCAP	−0.070	−0.063	−0.063	−0.062	−0.057	−0.059	−0.058
	(−1.678)*	(−1.514)	(−1.443)	(−1.429)	(−1.356)	(−1.376)	(−1.350)
MES	−0.088	−0.151	−0.192	−0.223	−0.123	−0.161	−0.162
	(−0.267)	(−0.465)	(−0.574)	(−0.665)	(−0.377)	(−0.489)	(−0.491)
BARRIERS72	−0.368	−0.345	−0.357	−0.386	−0.361	−0.341	−0.362
	(−2.410)**	(−2.280)**	(−2.286)**	(−2.454)**	(−2.378)**	(−2.212)**	(−2.348)**
Constant	0.083	−0.059	0.086	0.092	0.083	0.073	0.077
	(1.227)	(−0.855)	(1.209)	(1.296)	(1.223)	(1.031)	(1.097)
R^2	0.301	0.313	0.269	0.259	0.307	0.288	0.286
Adj. R^2	0.241	0.255	0.206	0.195	0.247	0.227	0.225
# of obs.	77	77	77	77	77	77	77
DF	70	70	70	70	70	70	70

T-statistics in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level, using a two-tailed *t*-test.

Panel 2: Extensions—Market-share instability measure: Absolute instability for top 2 firms

	Base Model	Traditional	Imports	2SLS	With R&D	R&D w/o Instability	R&D and Instability Interacted	R&D and Instability Interacted Only
MSINST			6.243	9.403	5.707		−3.702	
			(3.906)***	(2.232)**	(3.834)***		(−0.992)	
JIS			−0.172					
			(−0.308)					
R&D					2.147	2.406	−0.865	
					(3.397)***	(3.502)***	(−0.687)	
R&D* MSINST							150.45	101.98
							(2.728)***	(6.252)***
C4		0.136						
		(1.241)						
LABOR	−72.281	−68.165	−76.687	−86.405	−54.232	−42.444	−54.778	−56.917
	(−1.406)	(−1.328)	(−1.537)	(−1.779)*	(−1.219)	(−0.875)	(−1.288)	(−1.370)
HCAP	0.557	0.610	0.365	0.275	0.551	0.742	0.683	0.612
	(1.574)	(1.718)	(1.110)	(0.775)	(1.785)*	(2.228)**	(2.283)**	(2.142)**
PCAP	−0.094	−0.099	−0.071	−0.058	−0.034	−0.051	−0.049	−0.044
	(−2.065)**	(−2.182)**	(−1.684)*	(−1.282)	(−0.835)	(−1.154)	(−1.256)	(−1.160)
BARRIERS72	−0.363	−0.382	−0.363	−0.370	−0.154	−0.124	−0.124	−0.144
	(−2.170)**	(−2.279)**	(−2.351)**	(−2.359)**	(−0.987)	(−0.728)	(−0.829)	(−1.034)
MES	−0.310	−0.436	−0.084	0.024	−0.036	−0.230	−0.012	0.00074
	(−0.869)	(−1.180)	(−0.253)	(0.065)	(−0.116)	(−0.691)	(−0.040)	(0.0025)
Constant	0.194	0.093	0.087	0.028	−0.129	−0.055	−0.036	−0.018
	(2.848)***	(0.875)	(1.252)	(0.284)	(−1.447)	(−0.578)	(−0.346)	(−0.279)
R^2	0.146	0.165	0.302	0.289	0.401	0.274	0.460	0.452
Adj. R^2	0.086	0.093	0.231	0.229	0.341	0.211	0.397	0.405
# of obs.	77	77	77	77	77	77	77	77
DF	71	70	69	70	69	70	68	70

The ranking of top firms' market share is determined on year to year basis.
T-statistics in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level, using a two-tailed *t*-test.

negative sign. There is conflicting past evidence on the effect of advertising on market-share instability (for a summary, see Das, Chappell, and Shughart, 1993). Advertising can solidify the market positions of leading firms by differentiating products, creating brand loyalty, and raising the cost of entry and mobility. On the other hand, advertising can be a source of valuable information to consumers that can lead a successful increase in market shares of small firms or new entrants. It appears that the stabilizing effect of advertising on the market shares of leading firms dominates.

As predicted, there is a positive association between exogenous disturbances in the form of both growth of shipments and demand variation and market-share instabil-

ity, although the disturbance variables are not significant or have weak significance. A positive structural dampening effect of capital intensity on market-share instability is found, although the coefficient is not statistically significant. Neither measure of import pressure proved significant in explaining instability.[18] In general, exogenous disturbances prove not to be main sources of market-share instability.

The existence of a legal cartel stabilizes market-share fluctuations. The presence of export-import cartels is positively associated with market-share instability with varying degrees of significance. These findings are consistent with expectations.[19]

One might challenge the results by arguing that market-share instability depends more on an industry's exposure to fluctuations in international competition than on the domestic market structure characteristics that we explore here. We included a variable that captures a measure of industry world export volume instability, calculated as the sum of the absolute annual percentage changes in world export volume from 1988 to 1993 (all the years for which the data was available). Only a weak and negative correlation between this measure and our market-share instability measures is observed, supporting the view that market-share instability is primarily driven by domestic competition.

B. Model 2

Table 3 presents estimates of model 2, the world export share equation. Panel 1 reports the results using measures of absolute market-share instability. We find a positive and highly significant relationship between the extent of market-share fluctuation and trade performance. All the market-share instability measures are significant at the 1% level. This result is robust for any number of leading firms included. Our results suggest that the instability of shares among the top two or three firms has somewhat greater explanatory power than alternative measures.[20] Rivalry resulting in changes in share among the leaders, then, has greater influence on international competitive performance than rivalry primarily affecting industry followers. Adjusting for market size does not affect the significance of the results, indicating that the impact of instability is invariant to average firm size.[21] Both ways to select the top firms—separately in each year or based on the average market share ranking over the entire eighteen-year period—yielded similar results. Rivalry between contemporary industry leaders and rivalry between established leaders thus both strongly influence international trade position.

Trade protection, either at the beginning of the period or averaged over the period, has a negative effect on world export share and is highly significant. Recall that trade protection did not have a significant influence on market-share instability. Trade protection appears to work independently, perhaps diminishing the incentives for improving productivity. The size of the effect is modest, however, compared to that of market-share instability.

The factor-endowment variables have coefficients with signs consistent with expectations except for physical-capital intensity, although this variable is not significant. Overall, the explanatory power of the factor-endowment variables in determining world export share is modest. The scale economy measures are not significant in any specification, suggesting little role for home market size per se in export performance.[22]

In order to test the robustness of the model, other specifications are examined in panel 2.[23] First, the model from panel 1 is compared with a base model including only the factor-endowment measures, scale economies, and a protection measure as independent variables. On average, the market-share instability variable increases R^2 by 14%, almost as large as the variance explained by all of the control variables collectively.

Second, the model from panel 1 is compared with the base model which adds the traditional measure of rivalry, the industry concentration ratio. The industry concentration ratio is not statistically significant in explaining trade performance. The models employing market-share instability measures have much greater explanatory power. Third, import share is added to the market-share instability model. Import share is not statistically significant, nor does it contribute to explanatory power. Import competition does not appear to substitute for domestic rivalry.

Fourth, one might argue that trade performance and market-share fluctuations are simultaneously determined. To test the validity of this argument, we employed 2SLS estimation.[24] These results are qualitatively similar to the OLS results, supporting the robustness of the findings.

[18] Import share is highly correlated with advertising intensity, which reduces statistical power. In table 2, we report the results without including this variable. Alternative specifications of the import share variable were tested and yielded insignificant results in both model 1 and model 2.

[19] Combining all cartels into one variable yields a negative sign but is not statistically significant. We also explored models with various measures of relative market-share instability as the dependent variable. With a measure that discounts market-share change by large firms, the results are qualitatively similar to table 2. Using the measure that gives more weight to the market-share changes of larger firms, only the concentration variable remains significant.

[20] We also disaggregated market-share instability in two ways: instability of each of top four firms, and instability of the top two firms combined and the third and fourth firms combined. Market-share instability by the top four firms is jointly significant at the 5% level, although firm instability is not significant individually. These and other specifications reveal that the market-share instability of the top two firms has the greatest explanatory power.

[21] The coefficients remain positive with varying degrees of significance.

[22] Of the two scale measures, the results with the minimum efficient scale variable are reported here because the goodness of fit of regressions with this measure is slightly higher than the cases with the scale index. The coefficient of the scale index is not significant in any specification, with varying signs.

[23] All specifications involving different numbers of leading firms yield qualitatively similar results, and only representative results are reported here.

[24] In the first stage, all the control variables in model 1 and model 2 except market-share instability are used as instrumental variables. Other

Finally, we investigated the independent effect of R&D on trade performance by adding R&D intensity to the trade model. Recall that R&D had a modest effect on market-share instability in model 1, where it was positive but insignificant. In the export share equation, R&D proves highly significant and contributes substantially to explanatory power, and the market share instability measure remained highly significant. Without the market-share instability measure, the explanatory power of the equation declines substantially. These results suggest that local rivalry improves trade performance independently of R&D intensity. We also calculated a rough measure of the relative R&D intensity of the Japanese industry compared to the matched U.S. industry to see whether it was greater R&D by the Japanese industry that was driving the result. Relative R&D proved to be negative and insignificant. R&D intensity appears to be important to trade performance by proxying an industry attribute playing to Japanese strengths rather than a Japan-specific outcome.

Including the variable that interacts R&D intensity and market-share instability further improves the model's explanatory power (from 0.341 to 0.397), although the separate R&D intensity and market-share instability variables become insignificant. Introducing the interacted variable alone yields equal or slightly greater explanatory power to the equation with the two variables entered individually. Local rivalry revealed by market-share instability appears particularly likely to stimulate improvement and innovation, and improved trade performance, where R&D intensity signifies greater opportunities to differentiate in product or process development. After the R&D variable is added, the coefficient of the trade barrier variable loses significance, apparently due to its high negative correlation with the R&D variable.

A number of additional tests are not reported. First, the cartel variables do have a not-significant independent effect in the trade model. Evidently, the effect of cartels is captured by market-share instability. Second, the possibility that the results are driven by a small number of highly competitive industries is tested by excluding automobiles and industries in the consumer-electronics field. Eliminating these industries reduces the sample size to 66 but does not change the results. Finally, one could argue that the trade performance of Japanese industries might be explained by unmeasured Japan-specific advantages that are correlated with market-share instability. To test the common hypothesis that Japan is superior in durable-goods industries requiring rapid product and process improvement, a variable interacting R&D intensity and a durable-good dummy variable is included. The interaction variable is modestly more significant than R&D entered alone, and the market share instability measure remains highly significant.

specifications with different sets of instrumental variables were tested and yield qualitatively similar results.

VI. Conclusion

This article provides robust evidence that intense domestic rivalry is positively associated with international trade performance. Although we introduce a lag between market-share instability and our measure of trade performance, the results do not definitely establish causality. Also, market-share instability may proxy some unmeasured variables. However, our results are strongly suggestive of a view of competition as a dynamic process in which rivalry among locally based producers drives firms to constantly improve, in a way not substituted for by the presence of imports. The effect is particularly strong when R&D intensity reveals greater opportunities for improvement and innovation. Conversely, protection of the home market, by limiting competitive pressure, works against export competitiveness. Competing at home, then, fosters success abroad.[25]

Contrary to some popular views, our results suggest that Japanese competitiveness is associated with home market competition, not collusion, cartels, or government intervention that stabilizes it. Japan has practiced targeting, trade protection, and other selective intervention in industry competition that differs widely among industries, as our measures of trade protection and cartel presence attest. Our results raise serious questions about the received policy approach.[26]

Our findings suggest that preserving active local competition, far from being inappropriate or obsolete in a global economy, is important to a nation's productivity. Calls to relax the scrutiny of domestic market positions and reduce the health of domestic competition in antitrust enforcement would appear to be misguided. Although further research is warranted in smaller economies and those at earlier stages of development, these findings suggest a continuing role for national competition policy even in a global economy.[27]

REFERENCES

Allen, Bruce T., "Tacit Collusion and Market Sharing: The Case of Steam Turbine Generators," *Industrial Organization Review* 4:1 (1976), 48–57.

Arrow, Kenneth J., "The Economic Implications of Learning by Doing," *Review of Economic Studies* 29:80 (June 1962), 155–173.

Audretsch, David B., and Hideki Yamawaki, "R&D Rivalry, Industrial Policy, and U.S.–Japanese Trade," this REVIEW 70:3 (1988), 438–447.

Balassa, Bela, and Marcus Noland, "The Changing Comparative Advantage of Japan and the United States," *Journal of the Japanese and International Economies* 3:1 (1989), 174–188.

[25] We are unable to investigate whether domestic rivalry and the resulting export competitiveness results in higher profits. Domestic rivalry may escalate the competition in R&D and other forms that can dissipate profits, or, conversely, raise barriers to entry and support above-average profits (Sutton, 1991). However, the fact that our measure of Japanese R&D intensity relative to U.S. R&D intensity was insignificant mitigates against the view that it is higher spending alone by the Japanese industry that drives export performance.

[26] For a corroborating study on Japan, see Porter, Takeuchi, and Sakakibara (2000).

[27] A study in a cross section of 52 nations at widely varying levels of economic development reveals consistent findings. See Porter (1998b).

Baldwin, John R., *The Dynamics of Industrial Competition: A North American Perspective* (Cambridge, U.K.: Cambridge University Press, 1995).
Brander, James A., "Intra-Industry Trade in Identical Commodities," *Journal of International Economics* 11:11 (1981), 1–14.
Brander, James A., and Paul R. Krugman, "A Reciprocal Dumping Model of International Trade," *Journal of International Economics* 15:3/4 (1983), 313–321.
Caves, Richard E., and Ronald W. Jones, *World Trade and Payments: An Introduction* (Boston: Little, Brown and Company, 1973).
Caves, Richard E., and Michael E. Porter, "Market Structure, Oligopoly, and Stability of Market Shares," *Journal of Industrial Economics* 26:4 (1978), 289–313.
Das, Bhaskar J., William F. Chappell, and William F. Shughart, "Advertising, Competition and Market Share Instability," *Applied Economics* 25:11 (1993), 1409–1412.
Davies, S. W., and Paul A. Geroski, "Changes in Concentration, Turbulence, and the Dynamics of Market Shares," this REVIEW 79:3 (1997), 383–391.
Deardorff, Alan V., "Testing Trade Theories and Predicting Trade Flows" (pp. 467–517), in Ronald W. Jones and Peter B. Kenen (Eds.) *Handbook of International Economics*, vol. I (Amsterdam: North-Holland, 1984).
Dick, Andrew R., "The Competitive Consequences of Japan's Export Cartel Associations," *Journal of the Japanese and International Economies* 6:3 (1992), 275–298.
Eckard, E. Woodrow, "Advertising, Competition, and Market Share Instability," *Journal of Business* 60:4 (1987), 539–552.
Fallows, James, "Containing Japan," *The Atlantic* 263:5 (1989), 40–54.
Gort, Michael, "Analysis of Stability and Change in Market Shares," *Journal of Political Economy* 71:1 (1963), 51–63.
Grubert, Harry, and John Mutti, "Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making," this REVIEW 73:2 (1991), 285–293.
Heggestad, Arnold A., and Stephen A. Rhoades, "Concentration and Firm Stability in Commercial Banking," this REVIEW 58:4 (1976), 443–452.
Hufbauer, Gary C., "The Impact of National Characteristics & Technology on the Commodity Composition of Trade in Manufactured Goods" (pp. 195–231), in Raymond Vernon (Ed.), *The Technology Factor in International Trade* (New York: Columbia University Press, 1970).
Hymer, Stephen, and Peter Pashigian, "Turnover of Firms as a Measure of Market Behavior," this REVIEW 44:1 (1962), 82–87.
Johnson, Chalmers A., *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975* (Stanford: Stanford University Press, 1982).
Joskow, Jules, "Structural Indicia: Rank-Shift Analysis as a Supplement to Concentration Ratios," this REVIEW 42:1 (1960), 113–116.
Leamer, Edward E., and Harry P. Bowen, "Cross-Section Tests of the Heckscher-Ohlin Theorem: Comment," *American Economic Review* 71:5 (1981), 1040–1043.
Lee, Tom, and Louis L. Wilde, "Market Structure and Innovation: A Reformulation," *Quarterly Journal of Economics* 94:2 (1980), 429–436.
Linder, Staffan B., *An Essay on Trade and Transformation* (New York: Uppsala, Almqvist & Wiksell Boktr, 1961).
Lipsey, Robert E., and Merle Y. Weiss, "Foreign Production and Exports in Manufacturing Industries," this REVIEW 63:4 (1981), 488–494.
Loury, Glenn C., "Market Structure and Innovation," *Quarterly Journal of Economics* 93:3 (1979), 395–410.
Lynk, William J., "Information, Advertising, and the Structure of the Market," *Journal of Business* 54:2 (1981), 271–303.
Markusen, James R., *Productivity, Competitiveness, Trade Performance and Real Income: The Nexus Among Four Concepts* (Ottawa: Economic Council of Canada, Canada Communication Group, 1992).
Mueller, Charles E., "Antitrust in the Clinton Administration: Beware the 'National Champion' Theory," *Antitrust Law and Economics Review* 23:3 (1991), 1–12.
Nolle, Daniel E., "An Empirical Analysis of Market Structure and Import and Export Performance for US Manufacturing Industries," *Quarterly Review of Economics and Business* 31:4 (1991), 59–78.
Ohlin, Bertil G., *Interregional and International Trade*, rev. ed. (Cambridge: Harvard University Press, 1967).
Pagoulatos, Emilio, and Robert Sorensen, "Domestic Market Structure and International Trade: An Empirical Analysis," *Quarterly Review of Economics and Business* 16:1 (1976), 45–59.
Patterson, Paul M., and Philip H. Abbott, "Further Evidence on Competition in the US Grain Export Trade," *Journal of Industrial Economics* 42:4 (1994), 429–437.
Pickering, J. F., and I. M. Sheldon, "International Trade Performance and Concentration in British Industry," *Applied Economics* 16:3 (1984), 421–442.
Porter, Michael E., *On Competition* (Boston: Harvard Business School Press, 1998a).
——— "The Microeconomic Foundations of Economic Development," *Global Competitiveness Report* (Geneva: World Economic Forum, 1998b).
——— *The Competitive Advantage of Nations* (New York: Free Press, 1990).
Porter, Michael E., Hirotaka Takeuchi, and Mariko Sakakibara, *Can Japan Compete?* (New York: Basic Books, 2000).
Prestowitz, Clyde V., *Trading Places: How We Allowed Japan to Take the Lead* (New York: Basic Books, 1988).
Pugel, Thomas A., "Foreign Trade and US Market Performance," *Journal of Industrial Economics* 29:2 (1980), 119–129.
Reich, Robert B., *The Work of Nations: Preparing Ourselves for 21st-Century Capitalism* (New York: A. A. Knopf, 1991).
Scherer, F. Michael, *Industrial Market Structure and Economic Performance*, 2nd ed. (Chicago: Rand-McNally, 1980).
Schumpeter, Joseph A., *The Theory of Economic Development* (Cambridge: Harvard University Press, 1934).
——— *Capitalism, Socialism and Democracy* (London: Unwin University Books, 1943).
Shaffer, Sherrill, "Does Competition Imply Frequent Bank Turnover?" *Scandinavian Journal of Economics* 88:3 (1986), 511–527.
Shepherd, William G., *Market Power and Economic Welfare* (New York: Random House, 1970).
Stigler, George J., "A Theory of Oligopoly," *Journal of Political Economy* 72:1 (1964), 55–59.
Sutton, John, *Sunk Costs and Market Structure: Price Competition, Advertising and the Evolution of Concentration* (Cambridge, MA: MIT Press, 1991).
Swedenborg, Birgitta, *The Multinational Operations of Swedish Firms: An Analysis of Determinants and Effects* (Stockholm: Industrial Institute for Economic and Social Research, 1979).
Urata, Shujiro, "Factor Inputs and Japanese Manufacturing Trade Structure," this REVIEW 65:4 (1983), 678–684.
van Wolferen, Karel, *The Enigma of Japanese Power: People and Politics in a Stateless Nation* (London: Macmillan, 1989).
Yamawaki, Hideki, "Exports, Foreign Market Structure, and Profitability in Japanese and U.S. Manufacturing," this REVIEW 68:4 (1986), 618–627.
Yamawaki, Hideki, and David B. Audretsch, "Import Share Under International Oligopoly with Differentiated Products: Japanese Imports in U.S. Manufacturing," this REVIEW 70:4 (1988), 569–579.

APPENDIX A: DEFINITION OF MARKET SHARE INSTABILITY

Absolute Instability

$$AI_j = \left\{ \sum_{i=1}^{n} \sum_{t=1}^{m} |S_{it} - S_{i,t-1}| \right\} \Big/ (m*n) \quad \text{for the } j\text{th industry}$$

S_{it} = Market share of the i_{th} firm at period t calculated for $n = 2$, $n = 3$, $n = 4$, and $n =$ all firms available.

Relative Instability

Relative share instability (1)

$$R1I_j = \left\{ \sum_{i=1}^{n} \sum_{t=1}^{m} \frac{|S_{it} - S_{i,t-1}|}{S_{i,t-1}} \right\} \Big/ (m*n) \quad \text{for the } j_{\text{th}} \text{ industry}$$

S_{it} = Market share of the i_{th} firm at period t calculated for $n = 2$, $n = 3$, $n = 4$, and $n =$ all firms available.

Relative share instability (2)

$$R2I_j = \left\{ \sum_{i=1}^{n} \sum_{t=1}^{m} |S_{it} - S_{i,t-1}| * S_{i,t-1} \right\} \Big/ (m*n) \quad \text{for the } j_{\text{th}} \text{ industry}$$

S_{it} = Market share of the i_{th} firm at period t calculated for $n = 2$, $n = 3$, $n = 4$, and $n =$ all firms available.

APPENDIX B. DATA SOURCES

Trade data are taken from *The United Nations International Trade Statistics Yearbook.* Market-share data and four-firm concentration ratio are taken from *Market Share Encyclopedia,* Yano Research Institute, Tokyo, Japan (various years). Shipments, value added, and employment data are compiled from the *Census of Manufactures, Report by Industry, and Report by Products,* Research and Statistics Department, Ministry of International Trade and Industry. The average wage earned by a worker under age 17 (24) was obtained from the *Census of Wages* vol. 1, (or Industrial Wage Structure), Ministry of Labor. R&D/value added data are taken from A. Goto and K. Suzuki, "R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries" (this REVIEW 71 (November 1989), 555–564). Advertising data are constructed from Administrative Management Agency, Japan, *1965–1970–1975 Link Input-Output Tables,* Data Report 1 (1980). Legal cartel data are compiled from *The Fair Trade Commission Annual Report,* Fair Trade Commission (various years). Data on tariff and nontariff trade barriers are taken from United States Tariff Commission, *Trade Barriers: Report to the Committee on Finance of the United States Senate and its Subcommittee on International Trade, on Investigations 332-66 and 332-67 under Section 332 of the Tariff Act of 1930* (Washington D.C.: U.S. Government Printing Office, 1974), and Organization for Economic Co-operation and Development, *Indicators of Tariff and Non-tariff Trade Barriers.* (Paris: OECD, 1996.)

APPENDIX C
CORRELATION MATRIX

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 WES	—																					
2 MSINST, top2, absolute	0.43*	—																				
3 MSINST, top3, absolute	0.45*	0.95*	—																			
4 MSINST, top4, absolute	0.39*	0.91*	0.96*	—																		
5 MSINST, all, absolute	0.36*	0.87*	0.94*	0.96*	—																	
6 MSINST, top2, relative1	0.35*	0.78*	0.74*	0.73*	0.66*	—																
7 MSINST, top2, relative2	0.36*	0.89*	0.83*	0.77*	0.76*	0.45*	—															
8 LABOR	−0.12	0.04	0.08	0.09	0.14	0.10	0.02	—														
9 HCAP	0.07	0.08	0.05	0.06	0.05	0.11	0.05	0.27^{+}	—													
10 PCAP	−0.17	−0.07	−0.11	−0.13	−0.14	−0.12	0.01	0.23^{+}	0.57*	—												
11 SCALE	0.16	0.05	0.09	0.06	0.02	0.01	0.02	0.06	0.04	0.21$^{\wedge}$	—											
12 MES	−0.07	−0.16	−0.10	−0.09	−0.06	−0.24^{+}	−0.10	0.13	0.10	0.07	0.32*	—										
13 BARRIERS72	−0.22$^{\wedge}$	−0.01	−0.05	−0.04	−0.00	−0.13	0.12	−0.27^{+}	−0.28^{+}	−0.12	−0.50*	−0.18	—									
14 BARRIERS	−0.38*	−0.08	−0.13	−0.14	−0.09	−0.19$^{\wedge}$	0.06	−0.17	−0.24^{+}	0.13	−0.42*	−0.15	0.89*	—								
15 R&D	0.45*	0.10	0.19	0.18	0.17	0.07	0.05	−0.18	−0.28^{+}	−0.39*	0.34*	−0.05	−0.26^{+}	−0.46*	—							
16 ADV	−0.14	−0.16	−0.19$^{\wedge}$	−0.19	−0.19	−0.23^{+}	−0.05	−0.23^{+}	−0.45*	−0.19	−0.12	0.01	0.38*	0.33*	0.21$^{\wedge}$	—						
17 JIS	−0.09	−0.00	−0.01	0.01	0.03	−0.03	0.07	0.29^{+}	−0.04	−0.04	−0.03	0.06	0.03	0.10	−0.10	0.40*	—					
18 C4	0.07	0.21$^{\wedge}$	0.24^{+}	0.20$^{\wedge}$	0.25^{+}	−0.31*	0.49*	−0.07	−0.10	0.02	0.13	0.25^{+}	0.09	0.08	0.13	0.18	0.20$^{\wedge}$	—				
19 SHIPGRW	0.23^{+}	0.05	0.13	0.13	0.12	0.07	0.06	−0.02	−0.07	−0.15	−0.02	−0.14	0.04	−0.08	0.41*	0.09	−0.02	−0.04	—			
20 SHIPVAR	0.09	0.17	0.23^{+}	0.24^{+}	0.25^{+}	0.16	0.11	0.02	0.05	−0.06	−0.10	−0.07	0.01	−0.06	0.11	−0.10	−0.06	0.04	0.37*	—		
21 CARTEL	0.01	−0.06	−0.10	−0.12	−0.16	−0.11	−0.03	−0.24^{+}	0.24^{+}	0.31*	0.27^{+}	−0.08	−0.23^{+}	−0.11	−0.09	−0.04	−0.10	−0.01	−0.19	0.00	—	
22 EXCARTEL	0.10	0.05	0.06	0.05	0.04	0.06	−0.00	−0.20$^{\wedge}$	0.23^{+}	0.25^{+}	0.24^{+}	−0.09	−0.18	−0.13	−0.00	−0.10	−0.02	−0.11	−0.29^{+}	−0.14	0.53*	—
23 ALLCARTEL	−0.01	−0.09	−0.09	−0.09	−0.10	−0.08	−0.10	−0.27^{+}	0.16	0.23^{+}	0.20$^{\wedge}$	−0.11	−0.23^{+}	−0.16	0.01	−0.03	−0.06	−0.09	−0.24^{+}	−0.03	0.80*	0.83*

$^{\wedge}p < 0.10$; $^{+}p < 0.05$; $^{*}p < 0.01$ using a two-tailed t-test.
Top firms of market-share instability variables are determined by the share ranking on a year-to-year basis.