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Social Organization and Performance Inequality in Japanese and American Markets

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Abstract

With census data on comparably defined American and Japanese markets, I assess the extent to which competitive advantage is determined by market network structure in the two economies. I find significant differences between markets in the two economies, but on average, the social structural parameters known to determine the relative performance of American markets similarly determine the relative performance of Japanese markets. Profit margins are similar on average in corresponding Japanese and American markets, but performance differences between similarly structured American and Japanese markets increase with competitive disadvantage. Being at a competitive disadvantage in Japan is less costly than in the United States.

With the rise of Japan as an economic power relative to the United States, much social science attention has been given to how Japan is different from the United States. The image of the Japanese economy is a weave of dense and multiplex relations (Caves and Uekusa, 1976) in which visible and unspoken obligations obscure the market mechanisms that guide the day-to-day buying and selling (Dore, 1983; Kumon, 1992). The perception of a diffuse, permeable, and overlapping nexus of relations (Lincoln et al., 1992) at the core of the Japanese economy, combined with methodological culturalism (Hamilton, 1988) befog the situation. Studies have pointed out various dimensions of the Japanese economy believed to be characteristic of the economy and responsible for its high performance: high savings ratios, groupism, work ethics and the spirit of Japanese capitalism (Dore, 1983), human resource management and the employment system (Aoki, 1988), industrial policies and protectionism (Eads, 1988).

A preliminary question remains unanswered. How different are the transactional environments of American and Japanese producers? If Japanese buying and selling is constrained in some way different from the market constraints on American producers, different forms of organization are to be expected. If markets in the two economies are defined by similar patterns of constrained transactions, then observed differences between organization forms in the two economies are due to other factors, such as cultural and historical differences in the development of the forms.

I have census data on buying and selling among American and Japanese markets, market performance, and the organization of producers within markets. I find significant differences between markets in the two economies, but on average, the social structural parameters known to determine the relative performance of American markets similarly determine the relative performance of Japanese markets. Japanese and American firms are built on the same patterns of market transaction constraint. Their resource environments are similar in structure. Their differences lie in how they respond to the constraints.

MODEL AND DATA

Network models of competition are a productive result of increased exchange between economics and sociology over the last two decades. The sociological ideas elaborated by Georg Simmel and Robert Merton of autonomy generated by conflicting affiliations are mixed with the traditional economic ideas of monopoly power and oligopoly to produce network models of the extent to which producers in a market have a competitive advantage in negotiating the price of their transactions with suppliers and customers. The network models measure opportunities to broker connections between others — by having weak ties to distant others (Granovetter, 1973, 1983), by being between others (Freeman, 1977, 1979), or by having many diverse and exclusive relations (Cook and Emerson, 1978; Burt, 1980, 1982, 1983; Cook et al., 1983; Markovsky, Wilier and Patton, 1988).

These variations on the brokerage theme are the foundation for the structural hole theory of competition (Burt, 1992). The generating principle is that a transaction is more difficult to negotiate, and so less rewarding, when it is locked into other transactions that have to be negotiated at the same time. Discontinuities between transactions create entrepreneurial opportunities for brokerage. Brokerage provides information and control benefits. The benefits are a competitive advantage in negotiating transactions. So, the distribution of the discontinuities, or holes, in the social structure of transactions give competitive advantage to certain players at the expense of others. Among other things, players with a competitive advantage are expected to get a better return on their investments; e.g., faster promotions, higher profit margins, more sympathetic policy decisions.

The competitive advantage can be measured by the network concept of structural autonomy. Applied to networks of buying and selling, structural autonomy increases with the extent to which producers are organized within a market (few structural holes between producers) and transactions are disorganized beyond the market (many structural holes between suppliers and customers). Autonomous producers can negotiate advantageous prices in their transactions with suppliers and customers. The advantageous prices allow producer budgets to expand in various ways, including the bottom line; profit margins should increase with structural autonomy.

There is evidence to support the argument. Burt (1983) documents the association in 1967 between profits and structural autonomy in American manufacturing markets defined at broad and detailed levels of aggregation. Burt (1988) extends the results into nonmanufacturing through the 1960s and 1970s. Using profit and network data on markets in other countries, similar results have been observed in Germany during the 1970s (Ziegler, 1982) and Israel during the 1970s (Talmud, 1992, 1993). There is also evidence to support the argument in interpersonal relations. Manager promotions can be traced to the structural holes in a manager's network (Burt, 1992, Chap. 4), and strategic political behavior is patterned by network constraints between organization elites (Garguilo, 1992, 1993). My purpose in this paper is to compare Japanese and American markets from network perspective and see how well the argument describes performance differences between them.

For this paper, I use data on 44 aggregate markets distinguished by the Japanese Ministry of International Trade and Industry (MITI). The 44 markets include 7 raw material markets[1] 22 manufacturing markets, and 15 service and distribution markets. In addition, households and government agencies are included as customer markets1 The Ministry of International Trade and Industry constructed an input-output table of transactions among markets within each economy and between markets in the two economies (MITI, 1989). Transactions in the Japanese economy are based on a 1985 census of establishments. Yen are converted to dollars at the 1985 exchange rate (238.54 yen to the dollar, MITI, 1989, p.4). Transactions in the American economy are a recompilation of data used by the US Department of Commerce to construct the 1982 benchmark

[1] I'm ignoring the "unclassified" market of scrap, used and second-hand goods, noncomparable imports, and inventory valuation adjustments. Network constraint weights constructed with and without the "unclassified" market yield nearly identical transaction constraint coefficients (.98 correlation).

input-output table that was released in 1991. Instead of 40 players in Figure 1 aggregated into seven markets, there are thousands of business establishments in the American economy aggregated into 44 markets, and thousands of establishments in the Japanese economy aggregated into the same 44 markets. The criterion for aggregation is the same. Business establishments are aggregated into the same market if they depend on business with the same other markets. The data are a census of business establishments.

With the input-output table, MITI has provided a density table describing the network of transactions among and between American and Japanese business establishments.

These are markets in the sense that they are defined to contain establishments producing substitutable goods; each is obligated by cunrent production technologies to purchase a certain proportion of supplies from specific other markets, and their customers are shaped by their own technological requirements. This image of producers being competitors within the same market to the extent that they are substitutable in their transactions with suppliers and customers is a general one. It is captured in theory by certain equivalence definitions in network analysis and is the basis for interorganization resource dependence and the image of biological competition in population ecology analyses of organizations (see Burt, 1992, Chaps 6 and 7, Burt and Talmud, 1993, for elaboration).

I use concentration data to measure producer organization inside market; O varies from zero to one with the extent to which there are few independent producers. Each aggregate market is a set of market segments defined in the United States by four-digit Standard Industrial Classification (SIC) categories. Variable O is average concentration within segments.[2] Concentration data on manufacturing are from the *Census of Manufactures*, concentration in nonmanufacturing is approximated with sales data in other census publications from the US Department of Commerce, and the map of SIC categories into aggregate markets is taken from the *Survey of Current Business* (see Burt, 1988, p. 370; 1992, pp. 89-91, for detailed discussion). To describe the Japanese markets, I used unpublished records of four-firm concentration in manufacturing and a few nonmanufacturing markets provided by the Fair Trade Committee of Japan for 1988.

In the remaining nonmanufacturing markets, I approximate concentration with sales data as in the US. I identified the four largest firms operating in each market (in the Toyo Keizai compilation of 10,000 largest Japanese firms for 1985), summed their sales, and divided by total market sales. These

[2] O is defined as follows; $O = \Sigma_k w_k CR_k$, where segment weight wk is the proportion of market sales that come from segment k ($w_k = S_k/(\Sigma\ S_k)$, where Sk is the dollars of sales by establishments in segment k), and CR_k is the four-firm concentration ratio for segment k (largest sum of sales for establishments owned by any four companies in the segment divided by total sales by all establishments in the segment).

can be crude approximations. Ill use multiple strategies for comparing producer organization between markets.

Markets aren't independent production sites. They are variably interdependent within the political economy as a production network. A market's position in the network of variable interdependence has implications for market behavior. This can be measured by the extent to which producer buying and selling is concentrated in a few key customer and supplier markets and those markets contain few independent players. The essential qualities to be captured by the measure of organization beyond markets are the extent to which producers do business in very few different markets and those few are tied by exclusive dependence on one another (see Burt, 1992, pp. 54-62 on alternative specifications and connections with laboratory results on exchange networks). Network weight w_{ij} measures the extent to which producers in market i are dependent on, affected by, can't avoid, conditions in market j. Transaction constraint coefficient c_{ij} varies from zero to one measuring the extent to which there are few independently players in key market j: $c_{ij} = w_{ij}O_j$. So, three conditions constrain the transaction with market j: (1) Buying and selling with market j is a high proportion of producer business, (2) Other markets where producers buy and sell are in turn dependent on business with market j, and (3) there are few competitors in market j to play against one another.

Producers in the structurally autonomous market positions of a population are expected to show higher returns to investment; accumulating resources and further opportunities. Their structural autonomy is defined by the extent that there are numerous structural holes among the players with whom they negotiate and no holes among the producers;

$$A_i = f(O_i, c_{i1}, c_{i2}, c_{i3}, ...)$$

Hierarchical pattern in the constraint parameters indicates a strategic partner being used legitimate the central player (Burt, 1992, chap. 4), but level is the feature of constraint relevant for performance when legitimacy isn't an issue. The higher the aggregate level of constraint on producers, the lower their expected returns to investment. The sum of constraint parameters measures the aggregate constraint on producers; C varies inversely with the extent to which a market's suppliers and customers are spread across many disconnected markets that contain many competitors. The negative association between performance and constraint is the critical piece of evidence that establishes the construct validity of the constraint parameters. If the c_{ij} measure the resource constraints that define optimum producer organization forms, then the aggregate level of constraint should be negatively correlated with producer rates of return.

BASIC RESULTS

I measure market performance with price-cost margins computed from the input-output data. Price-cost margin P is net market income divided by total income — specifically, dollars of value added minus compensation to employees, quantity divided by total market income. This is a standard measure for comparing performance across manufacturing markets (attributed to Collins and Preston, 1969), and a reliable indicator when computed from input-output data for comparing markets more generally (Burt, 1988, pp. 371-375).

Performance isn't identical in corresponding Japanese and American markets, but it is very similar. Figure 2 plots the price-cost margin in each American market against the margin in the corresponding Japanese market. Markets above the diagonal line are more profitable in Japan. For example, steel producers in Japan earned an average 250 ¢ profit on each dollar of sales in the mid-1980s, while American steel producers earned only 6 ¢ profit. Similarly, finance, farming, and beverages and tobacco are noticeably more profitable in Japan. Below the diagonal in Figure 2, crude petroleum and natural gas drilling ("oil & gas"), forestry, and coal mining are noticeably more profitable in the United States. These deviations notwithstanding, market performance is more similar in the two economies than it is different. The price-cost margins in corresponding markets are correlated.76, standard deviations are identical within the two economies (.152), and variation within each economy makes negligible the slight mean difference between the economies. Mean price-cost margins are.23 across the Japanese markets, and .19 across American markets.[3] No significant performance difference between the two economies.

[3] 1.1 t-test with 86 degrees of freedom fails to reject the null hypothesis of no performance difference between the two economies, P =.30.

Figure 1. Price-Cost Margins in Corresponding Japanese and American Markets

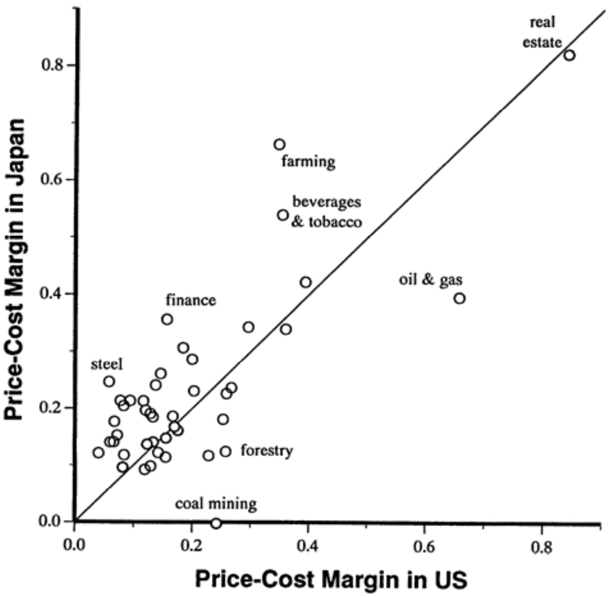


Table 1. Basic Results Predicting Market Price-Cost Margins.

	All Markets	Japanese Markets	American Markets
Number of Markets	88	44	44
R^2	.507	.448	.596
Intercept (α)	1.002	1.008	1.007
Adjustment for Higher Japanese Profits	.042 [.139] (1.6)	—	—
Adjustment for Higher Land-Oil Profits	.328 [.686] (8.7)	.329 [.693] (5.5)	.325 [.685] (6.7)
Effect of Disorganization Within Markets (β)	-0.035 [-.263] (-3.3)	-.025 [-.235] (-2.0)	-.070 [-.329] (-3.3)
Effect of Organization Beyond Markets (γ)	-0.042 [-.231] (-2.7)	-.059 [-.266] (-2.1)	-.034 [-.197] (-1.9)

Note—These are ordinary least-squares estimates predicting price-cost margins with models described in the text. Standardized coefficients are in [brackets] and routine t-tests are in (parentheses).

The results in Table 1 extend the similarity to market structure effects in the two economies. The basic model states performance as a function of structural autonomy, which decreases with producer disorganization and decreases with organization beyond the market (Burt, 1992, pp. 92-100; Burt, Yasuda, and Guilarte, 1993):

$$e\mathrm{P} = \mathrm{A} = \alpha\,(1 - \mathrm{O})\,\beta\,\mathrm{C}\,\gamma$$

where $\hat{P}$ is the price-cost margin expected from market structure, O is concentration, and C is the sum of constraints on producer transactions with supplier and customer markets. Estimates of the parameters are presented in Table 1 across all 88 markets, and across the 44 markets within each economy. The expected price-cost margin decreases significantly with market disorganization[4] and organization beyond the market.[5] In addition, analysis of American markets through the 1960s, 1970s, and into the 1980s distinguishes land and oil markets for their autocorrelated profits consistently higher than expected from market structure. The markets returning exceptional profits are real estate, crude petroleum and natural gas (oil and gas; not to be confused with petroleum refining), forestry and fishery products, and farming (excluding livestock). The dummy variable adjustment for these markets in Table 1 shows their significantly higher price-cost margins in both economies. Finally, returning to the null hypothesis of no performance difference between Japanese and American markets, the first column of Table 1 contains a dummy variable distinguishing Japanese markets from American markets. The test for no performance difference is now more precise because market structure variables O and C hold constant a portion of the price-cost margin variance within each economy. Margins are still higher in Japanese markets, and the t-test of 1.6 is stronger than the zero-order test of 1.1, but there is still no significant performance difference on average between corresponding Japanese and American markets.[6]

In sum, despite the very broad definition of markets in these data, *there is evidence to arguefor a similar structure-performance connection in Japan and the United States*. I've compared profit margins for 44 kinds of production activities in the two economies. The market structure effects known to predict performance differences between American markets — performance decreasing with market disorganization and the network constraint of organization beyond the market — also predict performance differences between Japanese markets.

[4] $\beta < 0$, with t-tests of -2.0 to -3.3.
[5] $\gamma < 0$, with t-tests of -1.9 to -2.7.
[6] With 83 degrees of freedom for the 1.6 t-test, the null hypothesis has a .11 probability of being true under a routine two-tail test.

CLOSER LOOK AT MARKET STRUCTURE

Though differences between the Japanese and American markets are negligible relative to their similarities, the differences exist. I'll now look more closely at market structure in the two economies to better understand the observed performance differences. Market structure in the network model is defined by two variables; producer organization O, here measured by concentration, and the network of market interdependences defined by the network constraint weights w_{ij} measured with the input-output data on dollars of buying and selling between markets. The two variables combine to define the level of constraint C on producer buying and selling with suppliers and customers.

Market Interdependence

The volume of buying and selling between markets is determined by technology. Car producers, for example, are obliged under current technology to purchase supplies from specific markets; steel, rubber, plastics, electronics, and so on. It is a short step to conclude that market interdependence in Japan should look the same as in the United States to the extent that production technologies are similar in the two economies. The conclusion would be true if the economies were self-contained. But the inter-market buying and selling dictated by production technology can be transacted inside or outside the economy; between domestic producers or with producers in foreign markets. Market interdependence can be different in Japan and the United States to the extent that foreign trade affects different markets in the two economies.

Figure 2. Corresponding Japanese and American Transactions.

(Transaction strength is percent of domestic buying and selling by two markets that occurs between the markets. Transactions under one percent are excluded.)

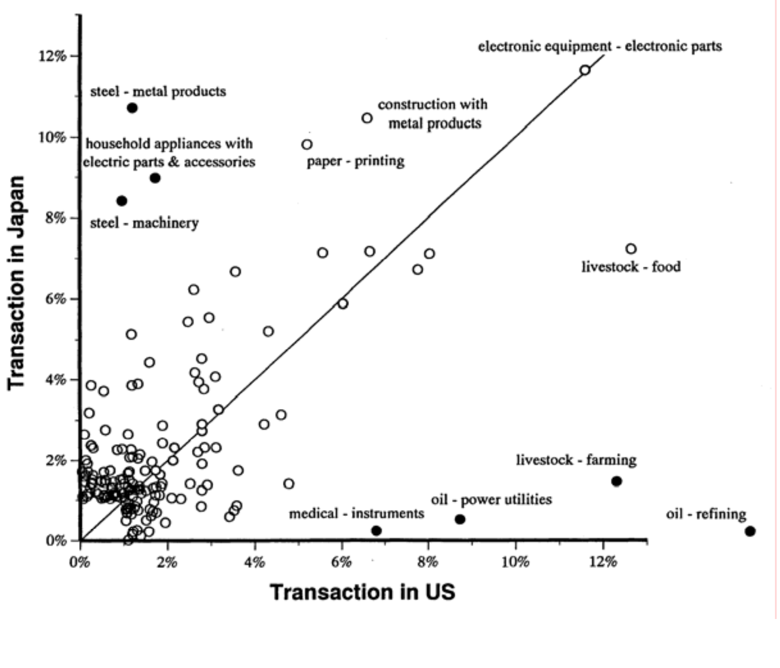


Table 2. Correlations between Japanese and American Transactions by Kind of Markets Connected.

	Raw Materials	Manufacturing	Distribution and Services
Raw Materials	.951 (21)		
Manufacturing	.502 (154)	.721 (231)	
Distribution and Services	.347 (105)	.763 (330)	.694 (105)

Note - Transaction strength is the percent of domestic buying and selling by two markets that occurs between the markets (plotted in Figure 3). Number of transactions in each correlation is given in parentheses.

Figure 3 and Table 2 present results on the relative strength of transactions between Japanese markets and the corresponding strength of transactions between their American counterparts. Transaction strength is based on the buying and selling between markets given in the input-output table. Divide the buying and selling between two markets by the sum of all buying and selling by the markets with other sectors in their economy. The result multiplied by 100 is the percent of domestic buying and selling by two markets that is conducted with each other.[7] There are 946 transaction dyads among the 44 markets in each economy. Transactions above the diagonal line in Figure 3 are conducted more between domestic producers in the Japanese economy. The three solid dots are extreme cases: Japanese machinery and metal products are more often constructed from Japanese steel (American machinery and metal products are more often constructed from imported steel). Household appliances in Japan are more often constructed from Japanese electric parts and accessories. Transactions below the diagonal line in Figure 3 are conducted more between domestic producers in the American economy. Petroleum refining is more dependent on crude petroleum from American producers, and power (electric and gas) utilities are more dependent on oil and gas fuel supplies from American firms. Americans eat more American livestock, and that livestock is more dependent on feed grains from American farms. Finally, American medical and health services are

[7] Specifically, let d_{ij} be the combined dollars of sales and purchases between markets i and j; $d_{ij} = z_{ij} + z_{ji}$. Let SUMi be the summed sales and purchases by producers in market i, excluding their business with one another; SUMi = $\Sigma_j d_{ij}$. The symmetric transaction strength measure in Figure 3 and Table 2 is $100*d_{ij}/(SUMi + SUMj - d_{ij})$.

more often provided with instruments manufactured by American firms.[8]

Transactions in the two economies are otherwise quite similar. The correlation between the 946 corresponding transactions in the two economies is.816 if the seven solid dot outliers in Figure 3 are excluded. That's two-thirds of variance in transaction strength identical between the two economies.

Table 2 shows how the aggregate correlation varies across kinds of markets. For example, there are seven raw materials markets in the MITI input-output table, and so 21 transaction dyads between raw materials markets. Their relative strength is very similar in Japan and the United States (.951 correlation).

Transactions involving manufacturing are very similar, in the two economies, whereas transactions between raw materials markets and the 15 distribution and service markets are least similar.[9]9 An illustration is the greater tendency for American power utilities, at the lower-right of Figure 3, to get their oil and gas fuel supplies from American producers. I rank-ordered the 105 transactions in the lower-left cell of Table 2 by the absolute difference of their magnitudes in Japan and the United States. The oil with power utilities transaction named in Figure 3 tops the list (.5% transaction in Japan, 8.7% in United States). The second largest difference also concerns fuel for power utilities. American power utilities are more likely to get their coal supplies from American mining firms (.7% transaction in Japan, 3.5% in United States). The third largest difference is much smaller and again concerns fuel supplies. The transaction between the real estate market and crude petroleum and natural gas producers is larger in the United States (1.1% versus 0.0% in Japan). Put these three transactions to one side, and the remaining 103 transactions are very similar in Japan and the United States (0.1% average difference,.77 correlation).

In sum, *the network of market interdependencies is similar in Japan and the United States — allowing for certain outlier transactions.* Reflecting Japan's scarce natural resource, transactions between power utilities, petroleum refining, and crude petroleum and coal are conducted more

[8] This is the only transaction for the medical and instruments markets that is so different in the two economies. I constructed a dummy variable for all transactions involving the medical market and another distinguishing all transaction involving the instruments market. I computed the absolute difference between transactions in Japan and the United States, and regressed differences across the two dummy variables. Differences are not significantly higher for either dummy (with all 946 transactions included, .0 15 multiple correlation, or with the seven solid dot outliers in Figure 3 excluded,.069 multiple correlation). The next largest difference is the slightly higher tendency for Japanese medical services to be provided with supplies from Japanese chemical companies (chemicals-medical transaction is 1.3% in US versus 3.9% in Japan).

[9] Correlations between transactions involving manufacturing are strong, but all increase to over.8 when the seven outlier markets in Figure 3 are excluded (.839 across 153 transactions with raw materials markets,.831 across 329 transactions with distribution and services markets, and.845 across 228 transactions with other manufacturing markets). The weakest correlation is the.347, in the lower-left of Table 2, across transactions between the 7 raw materials markets and the 15 distribution and services markets.

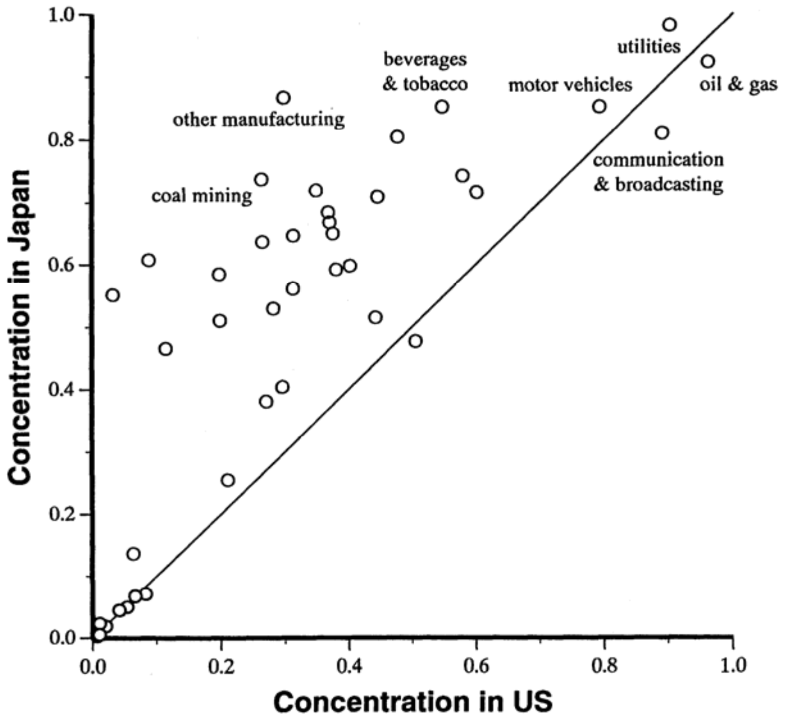
between domestic producers in the United States (three transactions). Steel for machinery and metal products is more often purchased from domestic producers in Japan (two transactions). Household appliances are more constructed in Japan with parts and accessories purchased from Japanese producers (one transaction). The American taste for beef is reflected in the larger domestic transactions among the American food, livestock, and feed grain markets (two transactions). Medical and health services in the United States are more often provided with instruments manufactured by American firms (one transaction). Put these nine of 946 transactions to one side, and the transaction strength between two Japanese markets is correlated.825 with the strength of transaction between the corresponding two American markets. Moreover, the magnitudes of the differences are small. The absolute difference between the nine outlier transactions in Japan and the United States varies from 2.8% to 21.3%, with a 5.2% standard deviation and 8.8% mean. The absolute difference between the other 937 transactions varies from being identical to a difference of 5.4%, with a 0.5% standard deviation and 0.3% mean difference.

Organization within Markets

Given similar patterns of producer dependence on supplier and customer markets, the other potential difference between markets in the two economies is the organization of producers within the markets. The difference is clear in Figure 4. Concentration in almost every Japanese market is as high, or higher, than concentration in the corresponding American market. On average, Japanese markets are more concentrated.[10] With the network of market interdependences similar in Japan and the United States, the higher concentration within Japanese markets means greater constraint on producer transactions with supplier and customer markets. Constraint C varies from.01 to.269 across American markets, with.058 mean and.061 standard deviation. Across Japanese markets, constraint varies from.022 to.413 with.096 mean and.09 standard deviation. Market constraint is significantly higher in Japan.[11] Since profit margins are similar in corresponding American and Japanese markets, the story here would be that better organized Japanese producers, having to negotiate transactions with better organized suppliers and customers, end up earning the same relative profit margins as their less well-organized American counterparts.

[10] 2.75 t-test, P =.007.
[11] 2.30 t-test, P=.020.

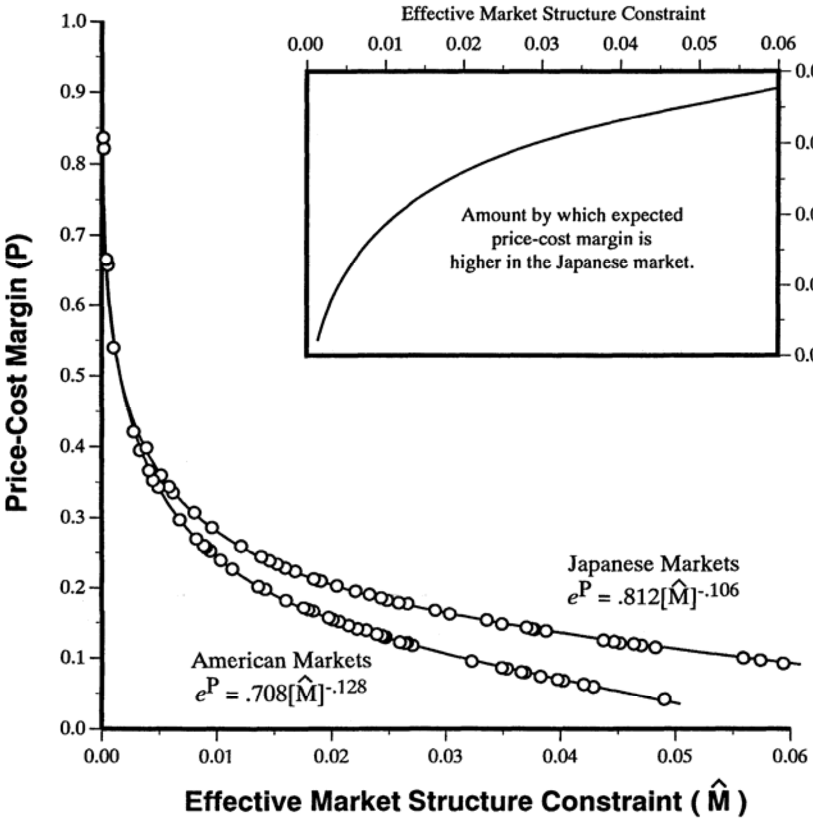
Figure 3. Concentration in Corresponding Japanese and American Markets.



An interesting story, but it is suspect. My concentration ratios are approximated in several Japanese and American markets from corporate sales data. The large firms used to approximate concentration are diversified across multiple markets. Treating all their sales as if from one market overstates their sales in the market. Concentration approximated from the aggregate sales of large diversified firms is likely to be higher than census data on concentration which is computed from establishment sales data. The concepts of effective organization and effective market constraint can be helpful as introduced elsewhere to resolve issues in measuring producer organization (Burt, Yasuda and Guilarte, 1993). Effective organization O varies from zero to one, and effective market structure constraint M is greater than zero to the extent that producers are in effect disorganized and dependent on effectively well-organized supplier and customer markets (see Appendix for detail). The question answered is the following: To obtain their known price-cost margin, operating from their known network position in the economy, how well organized must producers be? The variable O that answers the question is "effective" organization in the sense that producer organization is inferred from its effects.

Figure 4. Form of Markets Structure Effects.

(Dots indicate where markets occur on the function. One Japanese market to the far right is excluded to amplify the section of the function describing most markets.)



Market performance is plotted across levels of effective market structure constraint in Figure 5. Three points are illustrated. First, and in contrast to the Figure 4 results, there is no significant difference between Japanese and American markets in the effective organization of producers or the effective market structure constraint on producers. Effective organization is slightly higher in the United States, but the difference is negligible.[12] Therefore, given similar networks of market interdependence in the two economies, it isn't surprising to find no significant difference in the effective market structure constraint on American and Japanese producers.[13]

Second, the curves in Figure 5 show that market structure conditions of monopoly control yield similarly high profits in both economies. These are the markets to the left of Figure 5 - variable $\hat{M}$ is near zero to the extent that producers are well-organized and do their buying and selling with diverse, disorganized suppliers and customers. The steep decline in expected price-cost margin the left of

[12] .793 mean O versus.738 in Japan; 1.23 t-test, routine two-tail P is.22.
[13] .028 and.021 mean M in US and Japan; 1.56 t-test, routine two-tail P is .12.

Figure 5 replicates results reported for more detailed American markets (Burt, 1992, Chap. 3; Burt, Yasuda and Guilarte, 1993, Figure 2). The strongest market structure effects occur where market structure begins to move away from conditions of monopoly control.

Third, the location of higher performance in Japanese markets is identified. Given a Japanese market and an American market at the same level of producer disorganization negotiating with similarly organized suppliers and customers, higher profits are expected in the Japanese market. The amount higher increases for producers at a competitive disadvantage. Profit margins don't decrease as quickly in Japan as market structure constraint increases.[14] The result is an increasing profit gap between Japanese and American markets with increasing levels of competitive disadvantage. For example, at the far right on Japanese curve are: education, textile, food, and transportation service markets.[15] They perform better than similarly disadvantaged American markets do. At the far right on American curve are non-profit organization, steel, transportation equipment (except automobile), and construction markets.[16] Their price-cost margins are much less than those of similarly disadvantaged Japanese markets. The insert graph in Figure 5 shows the gap. There is little difference in expected price-cost margin for producers near the extreme conditions of monopoly control (M close to zero). Decrease producer organization, or increase the organization of suppliers and customers, such that market structure constraint M increases to.01 , and the Japanese producer can expect to earn 30 more profit on each dollar of sales than a similarly constrained American producer. Increase constraint to its average level,.025, and the Japanese producer can expect to earn 60 more profit per sales dollar than a similarly constrained American producer. Increase constraint to the maximum among American markets,.05, and the Japanese producer can expect to earn 80 more profit per sales dollar than a similarly constrained American. The point is that *the biggest performance differences between similarly structured American and Japanese markets occur between the most competitively disadvantaged markets. Being at a competitive disadvantage in Japan is less costly than in the United States.*

[14] γ is -.128 across American markets, -.106 in Japan. This result could also be obtained with the concentration data, but it is obscured in the separate direct and indirect effects, β and γ, in Table 1. Instead of defining effective market structure constraint M, with effective organization scores O, define observed market structure constraint M with concentration data O. The expected price-cost margin, eP= $\alpha\,[\mathrm{M}]\,\gamma$, is defined by the following ordinary least-squares estimates; α is 1.069, γ is -.034 across the Japanese markets; and α is.972, γ is -.048 across the American markets. The smaller γ shows that margins decline more slowly in Japan with increasing market structure constraint.

[15] Those markets plus repair, civil engineering, non-profit organization, paper products, forestry, and wooden products markets are the 10 markets on the far right.

[16] Those markets plus, electric and communication equipment, non-ferrous metal, textile, automobile, parts and accessories of electric and electronic equipment, and civil engineering are the 10 markets on the right.

SUMMARY

With census data on comparably defined American and Japanese markets, I have assessed the extent to which competitive advantage is determined by market network structure in the two economies. I draw three conclusions from the analysis.

First, despite the very broad definition of markets in these data, there is evidence to argue for similar structure-performance connections in Japan and the United States. The market structure effects known to predict performance differences between American markets — performance decreasing with market disorganization and the network constraint of organization beyond the market — also predict performance differences between Japanese markets.

Second, the network of market interdependences is very similar in Japan and the United States — allowing for certain outlier transactions. Transactions between power utilities, petroleum refining, and crude petroleum and coal are conducted more between domestic producers in the United States. Steel for machinery and metal products are more often purchased from domestic producers in Japan. Household electrical appliances are more constructed in Japan with parts and accessories purchased from Japanese producers. The American taste for beef is reflected in the larger domestic transactions among the American food, livestock, and feed grain markets. Medical and health services in the United States are more often provided with instruments manufactured by American firms. Put aside these nine outliers among 946 transactions, and the transaction strength between two Japanese markets is correlated.825 with the strength of transaction between the corresponding two American markets.

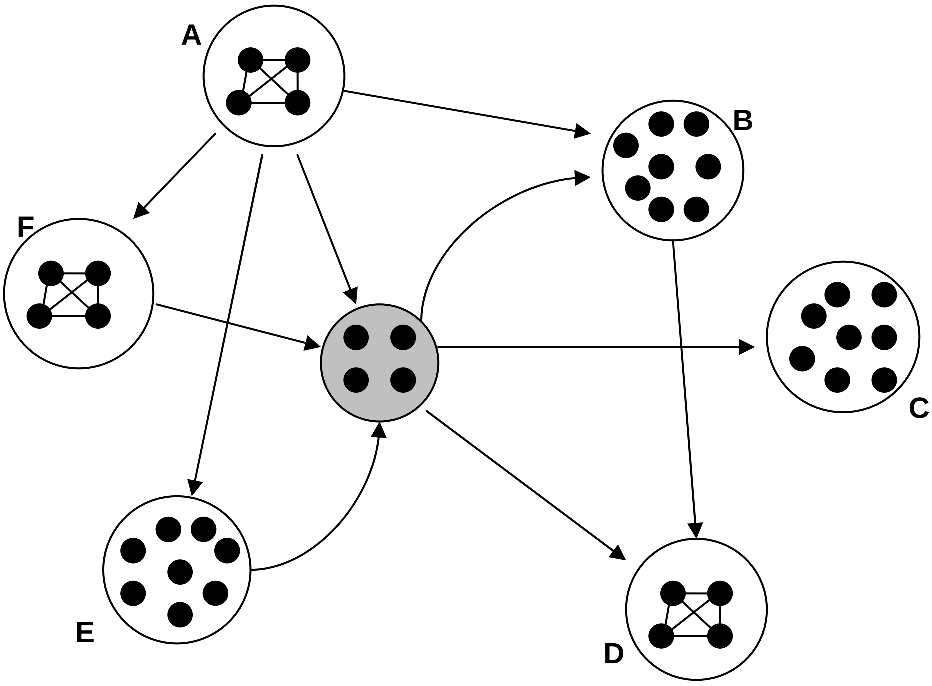
Third, profit margins aren't identical in corresponding Japanese and American markets, but they are sufficiently similar in relative magnitude across markets for the average difference between Japanese and American markets to be attributed to random chance. The performance difference varies with market structure, and, between similarly structured American and Japanese markets, they increase with competitive disadvantage. Being at a competitive disadvantage in Japan is less costly than in the United States.

APPEND IX

Define Markets

Applying the structural hole argument in empirical research involves four steps. The first is to aggregate players into markets. This is analogous to the familiar network analysis task of reducing a network to a density table (which could then be further reduced by recoding entries to zeroes and ones to define a blockmodel). Figure 1 is an illustration (taken from Butt, 1992). The sociogram is a fragment of the trade network around four producers in the market distinguished by the gray circle. Producers buy supplies from certain markets and sell their goods to customers in certain markets. Each dot is an organization, a player, producing something. Lines indicate connections between producers within markets and indicate aggregate buying and selling between markets. Players are contained in circles by their equivalent relations to players in other circles. The four players in the gray circle at the center of the figure, for example, all have relations with someone in each of the six other circles. The many inter-player relations between circles are replaced by a single line indicating their aggregate inter-market relation. The circles are markets in the sense that players within circles are substitutable. The relational resources that one player brings to transactions are what other players in the same circle bring.

Figure 5. Network Fragment Illustrating Market Structure Constraint.



	A	B	C	D	E	F
no holes between markets =	0.1512	0.0851	0.0278	0.0494	0.0434	0.0434
no holes within markets =	1.0000	0.1250	0.1250	1.0000	0.1250	1.0000
network constraint = cij =	0.1512	0.0106	0.0035	0.0494	0.0054	0.0434

Measure Organization Within Markets

The second step is to measure the extent to which producers are connected within markets such that there are few choices between independent trade partners for players dealing with the market. Of alternative ways to measure producer coordination (e.g., Burt, 1992, p. 63-64), concentration ratios are simple and have been successful in empirical research. Coordination is high to the extent that a few disconnected producers are responsible for a large proportion of market output. Assume that the producers in Figure 1 are the same size. A producer in the gray circle accounts for 25% of market business, the coordinated producers in market A account for 100% of their market's business, and a single producer in disorganized market C accounts for 12.5% of market business.

Measure Organization Beyond Each Market

The task of the third step is to measure the extent to which there are few structural holes between producer supplier and customer transactions. This can be measured by the extent to which producer buying and selling is concentrated in a few key customer and supplier markets and those markets contain few independent players. Network constraint weight wjj is the squared proportion of producer i business that directly or indirectly involves market j :

$$w_{ij} = (p_{ij} + \Sigma q\ piqpqj)^2,$$

where $i \neq q \neq j$ and p_{jj} is the proportion of producer business that directly involves market j. The direct proportion p_{ij} is the dollars of buying and selling between markets i and j, $(z_{ij}+z_{ji})$, divided by the sum of all producer buying and selling with other markets; $\Sigma_j(z_{ij}+z_{ji})$, $i \neq j$, where z_{ij} is dollars of sales from market i to j in the input-output table. The exact specification of the network weights is arbitrary.

The table at the bottom of Figure 1 illustrates constraint. Transactions between markets are dichotomous in the illustration. Proportions are therefore one over the number of a market's ties. Columns in the table show the extent to which gray-circle producer transactions with each supplier-customer market are constrained. The constraint coefficient c_{ij} (bottom row of table) is the product of coordination among players in market j (O_j in second row) and the coordination of transactions through the market (network weights w_{ij} in first row). Producer transactions with market C are least constrained. Market C players are disorganized and have no business with the other markets. Producer transactions with market A are most constrained. Market A players operate as a single organization and do business in three of the other supplier-customer markets.

Define Structural Autonomy To Predict Performance

There are two directions to go with the constraint parameters. One leads to theories of social and formal organization. The transaction-specific cjj describe the resource constraints that shape the form of organizations expected to be successful in a market. In structural hole theory, they measure the cost of producers doing business with market j under the rules of competitive pricing. If business with market j is constrained, then producers have an incentive to move the transaction from the rules of competitive price to another context; vertically integrating into market j, for example, so that corporate authority defines the negotiation. In transaction cost theory, the constraint parameters are the criterion for Coase's entrepreneur deciding to vertically integrate into market j. Their role in the organization theory of resource dependence (Pfeffer and Salancik, 1978; Pfeffer, 1987), transaction cost (Coase, 1937; Williamson, 1975, 1989), and population ecology (Hannan and Freeman, 1989) is reviewed elsewhere (Burt, 1988, pp. 390-393; 1992, Chaps. 6 and 7; see Davis and Powell, 1992, for more detailed review of resource dependence and transaction cost theory).

The other direction to go with the constraint parameters leads to stratification theories of inequality and achievement. The sum of constraint parameters measures the aggregate constraint on producers; C varies inversely with the extent to which a market's suppliers and customers are spread across many disconnected markets that contain many competitors.

$$C_i = \Sigma_j c_{ij} = \Sigma_j w_{ij} O_j,$$

where $i \neq j$. In Figure 1, aggregate network constraint on the gray-circle producers is the sum of the transaction-specific constraints (C =.26). For each of the aggregate markets, I have 43 constraint coefficients from the other production markets, plus a coefficient for households, and another for government. Variable C is the sum of 45 c_{ij} for each producer market i.

Estimate Effective Organization

I have measured market structure to predict market performance. The price-cost margin expected in a market is a function of market structural autonomy where structural autonomy in market i is defined as;

$$e\hat{P} = A_i = \alpha\,(1\text{-}O_i)\,\beta\,(C_i)\,\gamma \;=\; \alpha\,(1\text{-}O_i)\,\beta\,(\Sigma_j\, w_{ij}O_j)\,\gamma\;,$$

where $i \neq j$, β is the direct effect of producer disorganization on performance, and γ is the indirect effect on performance of producer organization filtered through the network of market interdependencies w_{ij}. I am confident in the census data on market performance and the network of market interdependencies, but am suspicious of the concentration data on organization within markets. Consider the following model in which observed producer organization, concentration O, is replaced by a measure of organization inferred from its effects, effective organization O:

$$eP = \alpha\,[(k - O_i)(\Sigma_j\, w_{ij} O_j)]\,\gamma\,,$$

where $i \neq j$, constant k equals 1.001, and the term in brackets is the aggregate effective market structure constraint on producers;

$$eP = \alpha\,[\hat{M}]\,\gamma\,.$$

This is a summary expression of the market structure-performance linkage, in which $\hat{M}$ is the effective market structure constraint. Effective organization and effective market structure constraints are distinct from variables such as concentration which measure observed features of producer organization believed to be responsible for market performance. There are no degrees of freedom. Performance in each market is completely determined by the direct effect of effective organization among producers and the indirect effect of effective organization in key supplier and customer markets.[17]

[17] The Newton-Raphson iterative algorithm for obtaining effective organization scores is described in the Appendix to Burt, Yasuda and Guilarte (1993). Applied here, the algorithm converged in 39 iterations for the American markets and 41 iterations for the Japanese markets, with a.001 convergence criterion. The direct and indirect effects of producer organization are equal in this application (ratio r is set to 1.0; Burt, Yasuda and Guilarte, 1993, Table 7). Observed price-cost margins are correlated 1.0000 with the margins expected from effective market structure constraint. I tried alternative start values for the iterations; the observed concentration scores and random fractions drawn from a uniform distribution. Effective organization scores obtained with the alternative start values are correlated 1.0000.

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