WHY ARE THERE SO MANY RETAIL STORES IN JAPAN?

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Working Paper No. 17

Abstract

The abundance of retail stores in Japan compared to what is observed
in the U.S. and elsewhere is due in part to legal obstacles to the open-
ing of large stores. These regulatory effects are measured by estimates
of regression equations explaining variation in numbers of stores per
household across Japan's 47 prefectures, and found not to be large enough
to fully account for Japan's relative abundance of retail stores. A
comparison of retailing cost data between Japan and the U.S. indicates
that in Japan retailers' reorder costs are low. This and Japanese
households' high storage costs imply that, apart from small but signif-
icant regulatory distortions, Japan's peculiar structure of retail trade
is an efficient adaptation to the conditions of the country. In carrying
out these investigations a new analytic model for explaining the geographic
density of retail outlets in an economy is constructed.

Why Are There So Many Retail Stores in Japan?

David Flath[*]

In Japan, small retailers are particularly common. In 1982 there were
145.3 retail stores per 10,000 persons in Japan, compared to 82.9 for the
United States.[1] The similar statistics for the United Kingdom, France, and
West Germany were 62.7, 74.8 and 67.0, respectively.[2] That Japan's
distribution system is inefficient for having so many stores has become a
cliche that appears in academic and journalistic writing on Japan as well as
in U.S. government position papers.

There are two economic arguments on which the inefficiency claim has
been based. One is the argument that Japan has a dualistic economy in which
the distribution sector, unlike some other sectors, is economically
backwards and riddled with anachronistic customs that have a cultural basis
rather than an economic basis. In this view, the large number of stores in
Japan is a symptom of economically wasteful overemployment in family
enterprises, in Lewis' terminology: disguised unemployment. Patrick and
Rholen (1987) have recently challenged the traditional dualism view, at
least as regards current-day Japan, but only to replace it with an argument
that is rather similar. They claim that those past retirement age
(generally 55 years) and women are denied equal employment opportunities in
anything other than family enterprise. Therefore they set up small stores
(or become subcontractors) because economies of scale are least there and

[1] Keizai kikakucho (1986), Table 2-4, p. 7.

[2] Ibid.

the inefficiencies of their being prevented by discrimination from fully exploiting their comparative advantages will be minimized. If there were less discrimination against women and the aged, there would be fewer family enterprises in Japan and fewer small stores.

The other inefficiency argument has to do with regulation. A succession of Japanese laws over the last half century have imposed bureaucratic obstacles to the establishment of large stores.[3] The Department Store Act of 1937, which was suspended in 1947 and then reinstated in 1956, required approval of the national government (Ministry of Commerce and Industry, prewar/Ministry of International Trade and Industry, postwar) for the opening of new department stores anywhere in Japan. In 1973 the Large Scale Retail Store Act replaced the Department Store Act and made the extent of floor space of proposed stores, rather than the nature of the stores, the criterion for necessitating MITI approval. The cutoffs were $3000m^2$ in the largest cities and $1500m^2$ everywhere else; in fact almost all stores of larger floor space than these cutoffs had been department stores. Finally in 1978 this law was completely revamped so as to broaden its coverage to include all proposed new stores with floor space above $500m^2$.

The entire process of reviewing an application to establish a new store takes about a year. Though the authority to approve new stores is vested in MITI, the statutes oblige MITI to consider the recommendations of locally constituted panels of consumers, businessmen, and academics, regarding not only whether to approve applications but also regarding floor space, hours and days of operation, and location of proposed new stores. The U.S.

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[3]Tamura (1981), pp.1-14, and Tsuruta (1980), pp.13-27.

analogue to these laws is local zoning. But local zoning in the U.S has had
an opposite effect on the structure of retailing to that of Japan's laws
pertaining to large stores. By separating commercial establishments from
residential areas, local zoning in the U.S. has tended to favor larger
stores over smaller ones. Mills and Ohta (1972), p. 703. The Japanese laws
favor small stores.

The Japanese laws requiring government approval for opening large
stores were lobbied for by the proprietors of small stores and passed for no
reason other than the protection of the owners of small stores. McCraw and
O'Brien (1986) place great emphasis on these laws as the explanation for the
large number of retail stores in Japan. As evidence that the laws have
seriously restricted the growth of large stores they cite the marked drop in
number of applications to open new stores following the enactment of the
1978 ammendments to the Large Scale Retail Store Act, to a mere trickle in
1984 of less than 500 applications for permission to open stores with floor
space in excess of 500m^2 in all of Japan, a country of 120 million persons.
Tamura (1986), p. 86, cites the same evidence in making a similar argument.

Though both the above arguments imply that there are more small stores
in Japan than is economically efficient, they leave aside the question of
just how many stores would be economically efficient. We ought to consider
whether in the absence of regulation and labor market dualism there would be
an inherent tendency in Japan for there to be many small stores.

Efficiency justifications for the predominance of small retailers in
Japan have been offered but have not been fully developed. For instance,
several authors have suggested that the shopping behavior of households is a

crucial factor in explaining the abundance of small stores. According to

Caves and Uekusa (1976),

> The low mobility of housewives has impelled many neighborhood
> stores that are necessarily small. Low household income and a
> lack of consumer durables (especially refrigerators) has meant
> frequent shopping trips and small-scale transactions--hostile
> to scale economies in store operation. (p. 116)

Similar claims are made by Yoshino (1971):

> Limited income, lack of storage facilities, and the strong
> preference for freshness led housewives to make frequent
> shopping trips, sometimes several daily. And of necessity
> they had to confine themselves to neighborhood shops....Thus,
> the lack of consumer mobility and the need to shop frequently
> have provided a powerful rationale for the existence of a
> large number of small stores. (p. 23)

It is natural to expect a link between shopping behavior and the

geographic density of retail stores. The greater the density of stores the

less is the distance from house to store for many consumers and the lower

are the consumers' costs of making shopping trips. But the more retail

outlets there are, the less are the scale economies in transporting goods

from producers to retailers. There would seem to be social gains from

having many retail outlets only if consumers' costs of storage and reorder

are high relative to those of the retailers, that is if retailers' storage

and reorder costs are low. In fact, a formal development of the argument

confirms this intuition, and data suggest that in Japan compared to the

U.S., households' storage costs are high and retailers' reorder costs are

low, both of which favor more stores per person in Japan than in the U.S..

The remainder of this paper is devoted to constructing an analytic

model for explaining the geographic density of retail outlets in an economy

and applying the model to the query in the title. In the analytic model, the number of stores that minimizes the consumers' and retailers' combined storage and reorder costs given the demand, is precisely related to cost parameters and to the geographic density of households. In a statistical model, variation across Japan's 47 prefectures in numbers of stores per household is explained both by proxies for household storage and reorder costs (tatami mats per person, motor vehicles per household, and fraction of population residing in densely inhabited districts) and by the severity of regulations impeding large stores (measured by number of department stores per household). Regulatory effects are well identified but not extremely large. This finding leads to a search for the additional factors underlying the relative abundance of retail stores in Japan. A comparison of retail cost data for Japan and the U.S. reveals that retailers' reorder costs are relatively lower in Japan than in the U.S. for most kinds of business.

The main reason there are so many small stores in Japan is not regulation. Rather it is that, because Japan is geographically compact, retailers' reorder costs are small and households' storage costs are great. The abundance of small stores in Japan, broadly speaking, represents an efficient adaptation to the conditions of the country.

1. A Model for Explaining the Density of Retail Outlets

A. General Considerations

Models that can explain the geographic density of retail outlets are an implicit feature of the spatial competition literature (Capozza and Van Order (1978), Salop (1979), Heal (1980), Novshek (1980)). My approach differs from that of the spatial competition literature in two ways. One is

that I assume that retailers, as well as households, have Baumol-type storage and reorder technologies, whereas in the spatial competition literature the technology of retailing usually is not specified except to assert that economies of scale are present. (Heal (1980) is a notable exception.) The purpose of my assumption is to introduce consumers' and retailers' inventory costs in a way that is informative but tractable.

The other difference is that I assume that, except for regulatory effects, the geographic density of retail outlets minimizes the households' and retailers' combined storage and reorder costs. The spatial competition literature makes no such assumption. Indeed, a typical result of spatial competition models is that the socially optimal number of retail stores is attained only by the merest coincidence if at all. The reason for assuming social optimality is that it enables one to ignore the pricing behavior of the sellers. This is an advantage because (pure) Nash equilibrium mill pricing strategies need not exist in the environment I propose.[4] The social optimality assumption amounts to the claim that retailing attains technological efficiency.

B. Assumptions

Households. Let households be uniformly arrayed with density D across an unbounded plane.

Nondurable good. Suppose that each household consumes some nondurable good at rate q which is the same for all households and is independent of

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[4]On this point see Gabszewicz and Thisse (1986). In their terminology, my model gives rise to "transportation costs" of consumers that are proportionate to the square root of the distance to the store for nondurables and proportionate to the distance to the store for durables, and "production costs" of stores that are proportionate to the square root of quantity supplied.

both the good's price and the household's storage and reorder costs. Let each household have storage costs equal to k per unit of average inventory of the nondurable good. Further, suppose that each time a household reorders it incurs costs equal to r times the distance from the household to the nearest retail outlet. We presume that each household chooses a frequency of reorder for the nondurable that minimizes its own storage and reorder costs.

Durable good. Suppose that each household maintains a stock of some durable good equal to one unit of it and that it replaces the unit at the exogenously determined rate q which is the same for all households. Let the households not have storage costs for the durable. Households have no decisions to make regarding the durable good.

Retailers. Retailers are uniformly arrayed across the plane, with density D_1 to be determined endogenously. For both nondurable and durable goods we suppose that the households' reorders are utterly unsynchronized so that each retailer's inventories are depleted at the continuous rate $(D/D_1)q$. For both types of good let retailers have storage costs K per unit of average inventory. Also, suppose that each time a retailer reorders he incurs costs equal to R, a constant. The uniform spatial density of retailers is endogenous and minimizes the global storage and reorder costs.

C. Households' storage and reorder costs

Nondurable good. The storage and reorder cost of an individual household distance t from the nearest retailer is

(1) $$s(t) = \frac{k\ell}{2} + \frac{rqt}{\ell} ,$$

where ℓ = reorder quantity, which implies $\ell/2$ = average inventory and q/ℓ = frequency of reorder. The household will choose ℓ to minimize this cost. One easily finds that

$$(2) \qquad \ell* = \sqrt{\frac{2rtq}{k}}$$

from which we deduce that

$$(3n) \qquad s(t) = (2krqt)^{\frac{1}{2}} .$$

By the assumptions that households purchase from the nearest retailer and retailers are uniformly arrayed with mean density D_1, the market served by each retailer is hexagonal with area D_1^{-1} and radius $D_1^{-1/2}12^{-1/4}$. Thus the storage and reorder costs of all the DD_1^{-1} households served by the same retailer are

$$(4) \qquad S(D_1) = 12D \int_0^{12^{-\frac{1}{4}}D_1^{-\frac{1}{2}}} \int_0^{\frac{x}{\sqrt{3}}} (2krq)^{\frac{1}{2}}(x^2 + y^2)^{\frac{1}{4}} \, dy \, dx$$

A look at figure 1 ought to make the logic fairly transparent. To evaluate (4), make the substitution $y = x \tan \theta$, noting that $(x^2 + y^2)^{\frac{1}{2}} = x \sec \theta$, $dy = x \sec^2\theta \, d\theta$, and $x \tan \theta = 0 \rightarrow \theta = 0$, and $x \tan \theta = \frac{x}{\sqrt{3}} \rightarrow \theta = 30$. Now we have

$$(5) \qquad S(D_1) = 12D \int_0^{12^{-\frac{1}{4}}D_1^{-\frac{1}{2}}} \int_0^{30} (2krq)^{\frac{1}{2}}x^{\frac{3}{2}} \sec^{\frac{5}{2}} \theta \, d\theta \, dx$$

$$= D \frac{2}{5} \cdot 12^{\frac{3}{8}} D_1^{-\frac{1}{4}} \int_0^{30} \sec^{\frac{5}{2}} \theta \, d\theta$$

$$\approx D(.627)(2krq)^{\frac{1}{2}}D_1^{\frac{5}{4}} .$$

The storage and reorder costs per household served by the retailer are

(6n) $C_0(D_1) = \dfrac{S(D_1)}{DD_1^{-1}}$

$\approx (.627)(2krq)^{\frac{1}{2}}D_1^{-\frac{1}{4}}$.

<u>Durable good.</u> The reorder cost of an individual household is

(3d) $s(t) = rqt$.

By reasoning similar to that applied to the nondurable we deduce that the reorder costs per household for the durable are

(6d) $C_0(D_1) \approx (.377)rq\, D_1^{-\frac{1}{2}}$.

D. <u>Retailers' storage and reorder costs</u>

   <u>Both nondurable and durable goods.</u> Each retailer serves D/D_1 households and incurs storage and reorder costs

(7) $s_1 = \dfrac{KL}{2} + \dfrac{RDq}{LD_1}$,

where $(D/D_1)q$ = rate of depletion of inventory, and L = reorder quantity.

   Each retailer chooses L so as to minimize its storage and reorder costs. One finds that

(8) $L* = \sqrt{\dfrac{2RDq}{D_1 K}}$,

so that

(9) $S_1(D_1) = (2KRD_1^{-1}Dq)^{\frac{1}{2}}$.

Thus the retailer's storage and reorder costs per household are

(10) $C_1(D_1) = \dfrac{S_1(D_1)}{D\, D_1^{-1}} = D^{-\frac{1}{2}}D_1^{\frac{1}{2}}(2KRq)^{\frac{1}{2}}$.

E.   Solution

For either type of good the global storage and reorder costs per household are

(11) $C(D_1) = C_0(D_1) + C_1(D_1)$.

The density of retailers that minimizes this cost is that which equates the marginal reduction in the households' storage and reorder costs with the marginal increase in the retailers' storage and reorder costs.

(12) $\dfrac{\partial C}{\partial D_1} = \dfrac{\partial C_0}{\partial D_1} + \dfrac{\partial C_1}{\partial D_1} = 0$.

For <u>nondurable goods</u> the solution to (12) is

(13n) $D_1^* \approx (.213) \dfrac{krD}{KR}^{\frac{2}{3}}$

and for <u>durable goods</u> this is

(13d) $D_1^* \approx (.533) \dfrac{Dq}{KR}^{\frac{1}{2}} r$.

F.   Comparative statics

The comparative statics of the model are easily deduced. For <u>nondurable goods</u>:

(14n)
$$\dfrac{dD_1}{dk}\dfrac{k}{D_1} = \dfrac{dD_1}{dr}\dfrac{r}{D_1} = \dfrac{dD_1}{dD}\dfrac{D}{D_1} = \dfrac{2}{3} \ .$$

$$\dfrac{dD_1}{dK}\dfrac{K}{D_1} = \dfrac{dD_1}{dR}\dfrac{R}{D_1} = -\dfrac{2}{3} \ .$$

$$\dfrac{dD_1}{dq}\dfrac{q}{D_1} = 0 \ .$$

For <u>durable goods</u>:

$$\frac{dD_1}{dr} \frac{r}{D_1} = 1$$

(14d)
$$\frac{dD_1}{dK} \frac{K}{D_1} = \frac{dD_1}{dR} \frac{R}{D_1} = -\frac{1}{2}$$

$$\frac{dD_1}{dD} \frac{D}{D_1} = \frac{dD_1}{dl} \frac{q}{D_1} = \frac{1}{2} .$$

Exogenous changes that increase households' costs of storage and reorder induce an increase in the density of retail outlets, which economizes by shifting more of the storage and reorder costs onto the retailers. Exogenous changes that increase the retailers' costs of storage and reorder induce a fall in the density of retail outlets, which economizes by shifting more of the storage and reorder costs back to the households. Greater geographic density of households in a sense implies greater reorder efficiency of the representative household and induces a disproportionately small increase in the density of retail outlets. Geographic density of retailers of durable goods is less sensitive to variation in density of consumers than is that of retailers of nondurables. Density of retailers of durable goods, however, is sensitive to flow demand of the representative household, whereas density of nondurables retailers is not.

Overemployment in family enterprises might be thought of as, in effect, lowering retailers' cost parameters R and K, inducing more outlets. In a global sense this phenomenon is wasteful (It is maintained that the families would be more productive in alternative pursuits), but from the view of consumers, the cost of physically transporting goods through the distribution system is made less by it.

Regulation such as under Japan's Large Scale Retail Store Law can be treated as establishing lower bounds on the geographic density of retail

stores. The precise placement of this lower bound will reflect local
political conditions.

2. Empirical Estimation

A. Geographic variation within Japan in number of stores per household

To test the model and to quantify the effects of regulation on the
numbers of stores of different kinds in Japan, I estimated the coefficients
of regression equations in which the dependent variables were natural
logarithms of the numbers of stores of each different kind per household in
each of Japan's 47 prefectures in 1985. (See Appendix A for the sources of
all data and see Appendix B for s.i.c. codes of the nine different kinds of
business). I used two alternative measures of "numbers of stores". One was
number of establishments classified as principally engaged in the respective
kinds of business. The other measure was the number of establishments
selling each commodity (including establishments principally engaged in
other kinds of business) summed within kinds of business to create a measure
of the average number of points of sale within each line of business.

The independent variables in the regressions were the fraction of each
prefectures' population residing in "densely inhabited districts," tatami
mats per person, motor vehicles per household, and natural logarithm of the
number of department stores per household. A tatami mat is a 3'X6' straw mat
and is the unit of measurement for the floorspace of houses and apartments
in Japan. For nondurable goods, tatami mats per person are intended to
represent household storage costs per unit of average inventory: the greater
the living space, the lower the storage costs. Motor vehicles per household

are intended to represent household reorder costs: families with motor vehicles have lower reorder costs than do families without vehicles. These variables are also included in the regression equations for durable goods retailers. Fraction of the prefecture's population residing in densely inhabited districts is a proxy for population density. Number of department stores per household in each prefecture is taken as an indication of the severity of local application of the Large Scale Retail Store Law; if the local opposition to new department stores is strong one expects to see fewer department stores and more other stores.

Results are reported in Table 1. The ln(points-of-sale/household) model performed rather better than the ln(establishments/household) model, but results were similar for both. The only kind of business that neither model at all fit was "general merchandise", i.e. department stores. This might be a reflection of regulatory effects. For the other kinds of business the model performed well. As the analytic model had enabled us to predict, the population density variable was inversely related to retailers per household and the size of the effect generally was estimated to be larger for nondurables than for durables. Also as predicted, for nondurables other than gasoline, the tatami mats per person variable and motor vehicles per household variable were inversely related to retailers per household, where significant. For durables and for gasoline, these variables were positively related to retailers per household, where significant. I would explain this last result as due to tatami mats per person being related to the scale of flow demand for apparel and furniture, and motor vehicles per household being related to the geographic density of households actually demanding gasoline or cars.

The coefficients on the logarithm of department stores per household do generally support the claim that bureaucratic obstacles to the opening of department stores have acted to increase the numbers of small stores. The elasticity of number of other stores to the number of department stores ranges from essentially zero in the case of motor vehicles, gasoline, and drugs and toiletries, to minus ten percent to minus twenty percent in the case of food, liquor, and apparel. There are about five times as many food stores per household in Japan as in the U.S. but only about one fifth as many department stores per household. (See Table 2). Can we say that if in Japan there were five times more department stores there would be four fifths fewer food stores? According to the estimated coefficient for food stores the answer is no. We would observe about one fourth fewer food stores. I conclude that while the cross-sectional evidence does demonstrate that regulation has contributed to the proliferation of small stores in Japan, regulation is not the only nor most important factor in explaining why there are so many small stores in Japan. To identify other important reasons for the Japanese structure of retailing I turn to a Japan-U.S. comparison of households' and retailers' costs.

B. <u>Japan-US variation in storage and reorder costs</u>

First, the generally higher population density of Japan would seem to favor fewer retailers per household than in the U.S., which is quite the opposite of what is observed for most kinds of business. See the first column of Table 2a and of Table 2b for numbers of retailers engaged in each kind of business per household in Japan and the U.S.

Second, any tendency towards greater division of labor within Japanese households than in American ones, with greater specialization in shopping in Japan, would tend to lower the reorder costs of households there (lower r), inducing fewer stores, not more. To the extent Japanese derive pleasure from shopping, this too lowers the households' reorder costs and has similar effects.

Third, the generally cramped living conditions and consequently high storage costs of nondurable goods for Japanese households (high k), would tend to favor more nondurables retailers in Japan, if the ultimate cause of the cramped living conditions, the high land prices, did not also cause retailers to have proportionately higher storage costs (high K). The positive sign on "tatami mats per person" in the nondurables retailers regressions, does indicate sensitivity of numbers of stores to households' storage costs, within Japan. Also, data to be described below indicate that retailers' storage costs are not very different between Japan and the U.S.. High household storage costs probably are a factor in explaining why there are so many more (nondurables) retail stores per person in Japan compared to the U.S..

Finally, the relative magnitudes of storage and reorder costs of Japanese and American retailers can be inferred from available data. Assuming optimizing behavior by retailers as described in Section 1D, one easily finds that each retailer's storage and reorder costs divided by two times his average inventory equals his storage cost per unit of average inventory. That is,

$$(14) \quad \frac{s_i^*}{L^*} = K \ .$$

By this logic retailers' operating costs divided by two times the value of average inventory measures the storage cost per unit of average inventory relative to unit value of inventory. These data are reported for Japan and the U.S. by kind of retail business in the second column of Table 2a and of Table 2b (see Appendix A for sources). For most businesses, storage costs per unit seem to be relatively greater in Japan than in the U.S., but the difference is not large.

Also assuming optimization by retailers, average inventory divided by quantity sold in a year equals the cost of a single reorder relative to the total storage and reorder costs for the year. In the earlier notation,

$$(16) \qquad \frac{L*/2}{(D/D_1)q} = \frac{R}{s_1^*} .$$

By this argument, and assuming that inventory is valued approximately at retail price, the value of average inventory divided by annual sales measures the cost of a single reorder relative to total operating cost. These data are reported for Japan and the U.S. in the last columns of Tables 2a and 2b. The statistic is generally quite a bit lower for Japan than for the U.S. and, with the exception of Drugs and Toiletries, is lower for each kind of business separately. An obvious reason for lower reorder costs in Japan than in the U.S. is that Japan is geographically compact; the distance from producer or wholesaler to retailer is therefore relatively small. An additional reason might be the abundance of displaced workers available for family enterprise; through their efforts transport costs might be reduced.

3. Conclusion

The more retail stores there are, the shorter is the distance from house to store for the representative consumer but the less are the scale economies in restocking the stores. Thus having more stores shifts inventory costs from consumers to retailers. In general this becomes socially optimal only if retailers are efficient at storage or reorder relative to the households, or if the geographic density of households is small.

Bureaucratic obstacles to the establishment of new department stores have increased the numbers of small stores in Japan, but not to a sufficient extent that this can be the main reason there are so many more stores per household in Japan than in other countries. Compared to the U.S., it seems that in Japan households' storage costs are high and retailers'reorder costs are low. These conditions both favor more stores per person. In this sense an abundance of small stores in Japan is an efficient adaptation to the conditions of the country (including the social conditions that channel displaced workers into family enterprise and perhaps contribute indirectly to lowering retailers' reorder costs).

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Appendix A. DATA SOURCES

Japan

1.   Fraction of population in each prefecture residing in densely
        inhabited districts ("area within the boundary of a city, town, or
        village which is composed of a group of contiguous census enumeration
        districts with high population density (in principle, 4,000
        inhabitants or more per square kilometer) and constitutes an
        agglomeration of 5000 inhabitants or more") in 1980.
    Source: Statistics Bureau, Management and Coordination Agency, Japan
    Statistical Yearbook, 1984, Table 2-6, pp. 30-31.

2.   Number of private households in each prefecture in 1980.
    Source: Ibid., Table 2-21, p. 49.

3.   Tatami mats per person in each prefecture in 1980.
    Source: Ibid., Table 15-1, p. 512.

4.   Motor vehicles owned per household in each prefecture in 1980.
    Source: Ibid., Table 15-27, p. 545.

5.   Number of retail establishments engaged in each kind of business in
        each prefecture in 1985 .
    Source: Research and Statistics Department, Minister's Secretariat,
    Ministry of International Trade and Industry, Census of Commerce 1985,
    Volume 2, Report by Industries (Prefectures), Table 2, pp. 20-259.

6.   Number of establishments selling each commodity, summed within each
       line of business (to create a measure of the average number of points
       of sale within each line of business) in each prefecture in 1985.

   Source: Census of Commerce 1985, Volume 4, Report by Commodities, Table

   2, pp. 362-631.

7.   Total sales and total operating expenses of incorporated retail
       establishments engaged in each kind of business in 1985 and number of
       such establishments.

   Source: Census of Commerce 1985, Volume 1, Report by Industries

   (Summary), Table 14, pp. 356-375.

8.   Total sales and value of merchandise inventory of all retail
       establishments (incorporated or unincorporated) engaged in each kind
       of business in 1985.

   Source: Ibid., Table 4, pp. 38-76.

United States

9.   Sales, inventories, and operating expenses in 1982 for retail
       establishments with payroll, engaged in each kind of business.

   Source: U.S. Department of Commerce, Bureau of the Census. 1982 Census of

   Retail Trade. Industry Series, "Measures of Value Produced, Capital

   Expenditures, Depreciable Assets, and Operating Expenses," Table 1,

   pp. 2-4.

10.   Total number of households in the United States in 1980.

Source: U.S. Department of Commerce, Bureau of the Census.   <u>Statistical</u>

<u>Abstract of the U.S., 1986</u>, Table 59, p. 42.

(= 80,776,000)

11.   Number of retail establishments engaged in each kind of trade in the

United States in 1982.

Source: <u>Ibid</u>., Table 1396, p. 775.

Appendix B. KINDS OF RETAIL BUSINESS, JAPAN AND THE UNITED STATES

| Kind of Business | United States | | Japan | |
	Sic code	Name	Sic code	Name
All retailing	52-59	Retail trade	53-58	Retail
Hardware and garden supplies	52	Building materials, hardware, garden supply, and mobile home dealers	572	Hardware and kitchenware stores, except agricultural
General merchandise	53	General merchandise	53	General merchandise
Food	54	Food stores	55 (ex. 552)	Food stores
Motor vehicles	55 (ex. 554)	Automotive dealers	56 (ex. 56211)	Motor vehicles
Gasoline stations	554	Gasoline service stations	5831	Gasoline stations
Apparel	56	Apparel and accessory stores	54	Dry goods, apparel, and accessories
Furniture and fixtures	57	Furniture, home furnishings, and equipment stores	57 (ex. 572)	Furniture and fixtures
Drugs and toiletries	5912	Drug stores and proprietary stores	581	Drug and toiletry stores
Liquor	5921	Liquor stores	552	Beverage and seasoning stores
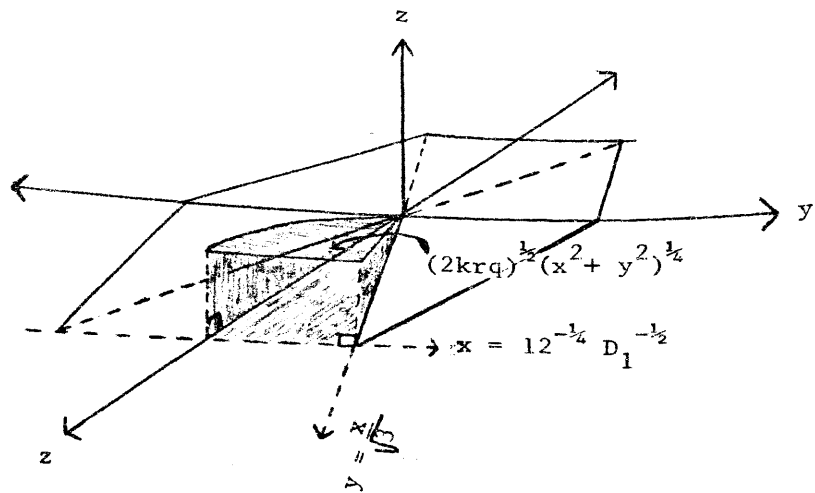
Figure 1. Storage and reorder costs of households
served by the same retailer

Table 1a. Coefficients from ln(points-of-sale/households) Models: Japan

	Mean (s.d.)*	All retailing	Nondurables				Durables				
			Drugs and toiletries	Food and beverages	Liquor	Gasoline	Apparel	Furniture and fixtures	General merchandise	Motor vehicles	Hardware and garden supplies
Intercept	----	-2.700 (.606)	-5.313 (.612)	-3.068 (.786)	-4.854 (.979)	-6.531 (.686)	-6.845 (.710)	-6.268 (.596)	-7.892 (.758)	-6.558 (.598)	-5.890 (.620)
Fraction of population residing in densely inhabited region	.454 (.183)	-.466 (.147)	-1.415 (.149)	-1.994 (.191)	-1.363 (.238)	-.404 (.167)	-.404 (.173)	-.590 (.145)	.036 (.422)	-.562 (.146)	-1.198 (.151)
Tatami mats per person	8.851 (1.125)	.005 (.018)	.016 (.018)	-.038 (.024)	-.045 (.029)	.010 (.021)	.094 (.021)	.090 (.018)	-.004 (.052)	.100 (.018)	.061 (.019)
Motor vehicles per household	.759 (.137)	-.166 (.054)	.012 (.055)	-.523 (.071)	-.825 (.088)	.468 (.062)	.221 (.214)	.210 (.180)	.231 (.521)	.996 (.181)	-.042 (.187)
Logarithm of dept. stores per household	-9.907 (.328)	-.126 (.054)	-.016 (.055)	-.162 (.071)	-.183 (.088)	-.037 (.062)	-.184 (.064)	-.073 (.054)	---	.016 (.054)	-.067 (.056)
R^2	----	.718	.403	.645	.692	.842	.647	.756	.006	.866	.824

*Numbers in parentheses are standard errors.

Sample size = 47.

Table 1b. Coefficients from ln(establishments/households) Models: Japan

	Mean (s.d.)*	All retailing	Nondurables				Durables				
			Drugs and toiletries	Food and beverages	Liquor	Gasoline	Apparel	Furniture and fixtures	General merchandise	Motor vehicles	Hardware and garden supplies
Intercept	----	-3.887 (.572)	-5.734 (.794)	-4.577 (.720)	-4.348 (.840)	-6.574 (.601)	-8.032 (.904)	-6.963 (.791)	-9.962 (.740)	-8.929 (.765)	-9.831 (.847)
Fraction of population residing in densely inhabited region	.454 (.183)	-.625 (.139)	-.276 (.194)	-.906 (.175)	-1.514 (.205)	-1.253 (.146)	.164 (.220)	-.571 (.193)	.016 (.412)	-.193 (.186)	-.012 (.206)
Tatami mats per person	8.851 (1.125)	.007 (.017)	-.023 (.024)	-.052 (.022)	-.076 (.025)	.009 (.018)	.075 (.027)	.068 (.024)	-.016 (.051)	.042 (.023)	.067 (.026)
Motor vehicles per household	.759 (.137)	.051 (.173)	.356 (.240)	-.354 (.217)	-.758 (.254)	.493 (.181)	.455 (.273)	.310 (.239)	.266 (.509)	1.404 (.231)	.411 (.256)
Logarithm of dept. stores per household	-9.907 (.328)	-.110 (.052)	.018 (.072)	-.167 (.065)	.065 (.076)	-.047 (.054)	-.197 (.082)	-.100 (.071)	---	-.110 (.069)	-.201 (.076)
R^2	----	.573	.232	.469	.761	.851	.324	.609	.012	.730	.379

*Numbers in parentheses are standard errors.

Sample size = 47.

Table 2a. Retailing Data: Japan and the U.S.

Kind of Business	Establishments (th.) households		$\dfrac{K}{P}$ [a]		$\dfrac{R}{s}$ [b]	
	Japan	U.S.	Japan	U.S.	Japan	U.S.
All retailing	45.463	23.809	1.173	1.132	.097	.121
Hardware and garden supplies	1.502	1.096	.666	.736	.142	.192
General merchandise	.099	.553	1.233	.846	.087	.190
Food	15.758	2.992	2.740	1.774	.042	.063
Motor vehicles	1.331	1.601	1.936	.548	.058	.146
Gasoline stations	1.439	1.677	n.a.[c]	1.861	.030	.031
Apparel	6.409	1.968	.721	.887	.200	.207
Furniture and fixtures	5.724	1.630	.791	.845	.156	.204
Drugs and toiletries	2.378	.644	.680	.761	.217	.178
Liquor	2.978	.514	1.124	.761	.075	.111

For sources, see Appendix A.

[a] $\dfrac{K}{P} = \dfrac{\text{operating expenses for year}}{2(\text{value of inventories})}$

[b] $\dfrac{R}{s} = \dfrac{\text{value of inventories}}{\text{sales for year}}$

[c] Not available.

Table 2b. Retailing Data

Kind of Business	Estab./households - Japan Estab./households - U.S.	K/P - Japan K/P - U.S.	R/s - Japan R/s - U.S.
All retailing	1.909	1.036	.804
Hardware and garden supplies	1.371	.904	.741
General merchandise	.179	1.458	.456
Food	5.266	1.544	.665
Motor vehicles	.832	3.530	.395
Gasoline stations	.858	not available	.957
Apparel	3.256	.812	.964
Furniture and fixtures	3.511	.936	.764
Drugs and toiletries	3.694	.894	1.224
Liquor	5.796	1.477	.677

See note at bottom of Table 2a.