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EXPLORING THE ROLE OF MARKET ALLOCATION IN URBAN HOUSEHOLD CONSUMPTION DURING CHINA'S ECONOMIC STRUCTURAL REFORM

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Introduction

During the 1980s, China's economy under the economic reform program grew rapidly. Yet, debate raged regarding the nature and depth of the changes. The events culminating in tragedy during 1989 raised further questions concerning the path China's economic policymakers had pursued. Many held that the economic reform program had reached an impasse. Yet, at close inspection, specific sectors during the late 1980s and early 1990s reveal a startling picture of economic growth and institutional development.

This paper examines one facet of this development, the growth of market allocation in the realm of urban household consumption. The study briefly reviews other's studies of China's consumption and then tests the hypothesis that markets have determined the allocation of some resources over the reform period. The increasing role of the market in urban household decisions is empirically detectable and significant as an indicator of achievement under the economic structural reforms. Yet, distortion is evident even in the market-determined categories of goods, due in part to the major aspects of urban household decisions where the market as-of-yet remains distant, including housing, wealth formation and related goods and services. These yet-unreformed categories, together with serious questions regarding the inter-temporal allocation of consumption present areas for further study, and a serious challenge in China's future.

By various measures, average annual growth in real consumption

between 1978 and 1990 has been estimated at about 7 percent, albeit at a declining rate. While measurement problems raise questions regarding these estimates, growth was not necessarily more, or less, as a result. Growth in unobservable flows of real income are a possibility suggested by growth bursts in specific categories of durable acquisitions, although diversion of wealth formation into consumption is another possible explanation.

Review of Literature

The status of consumption in China, and the central role of markets in consumption under the reform program, have received notable attention. A representative sampling includes Lardy's 1984 study of the general pattern of consumption and living standards during the early reform period (1978-83), and its strategic importance in policy. Chai (1992) extends the review up to 1990. The official publication China's People's Consumption by the Year 2000 (1987) reviewed past performance and predictions. The structure of food consumption in China is examined by Theil et al. (1987). Urban housing is reviewed by Lee (1988), and urban household expenditure patterns based on 1982 and 1984 Tianjin data are studied by Hu et al. (1985, 1987). Duo (1991) presents a dynamic macroeconomic consumption function.

There have been several analyses of consumption utilizing estimates of income-and-expenditure relationships (partial-equilibrium demands). These include analyses of the structure of consumption over all China by Van der Gaag (1984) and Li et al.

(1985), both sponsored by the World Bank; Lewis et al. (1989) apply the Extended Linear Expenditure System (Lluch et al. 1973); Chern et al. (1989) study the impact of rationing on urban household consumption using the Almost Ideal Demand System (stated in Deaton and Muelbauer 1980). In general the studies cited have as their purposes to review the general performance and prospects of consumption in terms of composition and growth trends, sometimes by comparison, and with or without explicit econometric analysis based on assumed causal relationships. In the studies exploring consumption through econometric analysis, the general assumption of the causal relationships implies consistent institutional conditions over the entire period of study. The studies draw major inferences regarding the patterns and causes of consumption, and many present prognoses. In fact, while there is ample evidence of economic growth and a distinct appearance that the Chinese policymakers and public have quickly adopted the markets to rationalize at least some economic decisionmaking, the rate of institutional change has been rapid, and a substantial debate continues in China and outside regarding the efficacy and direction of reforms.

Approach, Part I: Examine Demand for Non-durable Consumption

This study, rather than examining consumption indicators and analyzing performance of reforms based on an assumed degree of market allocation or lack thereof, chooses to search for evidence of market allocation by comparative examination of the changes in

causal relationships estimated using separate data for each year over the critical period 1983-1990 (1983-87 national results are reported, 1988-90 national and 1981-1986 Shaanxi provincial data yet-to-be completed), and by careful comparison of these to analogous studies of the relevant sectors of other countries at arguably comparable periods of economic development.

Specifically, the basic method of Ordinary Least Squares (OLS) is applied to urban household income-and-expenditure survey data for each year, from thirty to one hundred cities, aggregated to the city level. A separate test is performed for each year as the purpose is to observe institutional change--change in the degree of actual market allocation--over time. The expression of household demand for major types of consumption goods is estimated in the standard, partial equilibrium Marshallian form wherein the quantity demanded of each good is a function of own-price, related prices, and total expenditure. The demand for each type of good in the bundle is determined simultaneously with the others.

Not all goods and services in the household's consumption are treated with the same partial equilbrium model. Categories of goods and services for which there exist overwhelming anecdotal and descriptive evidence of market distortions or non-price allocative mechanisms, precluding any marginal pricing and expression of consumer preferences, are left out of the Marshallian demand calculation. This does not necessarily exclude goods for which some subsidies with the nature of lump-sum grants

may shift the demand at the same time there exist legal free markets, such as the issue of per capita grain and oil ration coupons with "grey market" value, in urban grain consumption. This approach does exclude aspects of income-and-expenditure related to wealth formation such as the demand for housing, durables acquisition, health, education, saving and other financial instruments, and social security. Agricultural sector income-and-expenditure behavior is excluded from direct comparison partly on the principle that the institutional framework is at wide variation from the urban sector, and partly in consideration of data availability in practice, discussed under "Data," below.

In the neoclassical theory of consumer behavior, the additive separability of utilities between categories of goods and services is axiomatic. The implication for this study is that determination of the proportion of expenditure used on each of the major categories of goods and services--nondurables, durables, housing, health, education, wealth formation--depends on income and availability of these categories. Once the proportion of income to be expended on a each given category is determined, the allocation of expenditure to types of goods and services within each category proceeds, depending on expenditure on the category and the relative prices within the category, but independent of expenditures within the other categories.

The Linear Expenditure System (LES), as described by Deaton and Muellbauer (1980), is the appropriate form of equation for this econometric test. Bowen (1992) presents a detailed

specification of the system of equations, and the explanation for this choice, including consideration and a test of the major competing alternative, the Almost Ideal Demand System.

Approach, Part II: Examine the Diffusion of Durable Acquisition, and Microanalytic Simulation Modeling of Systems

For wealth-related categories there continue to exist major obstacles to expression of household demand and/or there may be alternatives to, or distortions of, market allocation. Alternative analytical methods are necessary--diffusion theory of durable good acquisition, demographic projections of the demand for social security, and microanalytic simulation modeling for all aspects of household behavior within a system. These methods are useful to understand empirical trends and projected policy challenges, but are less direct and less satisfactory in analysis of the role of markets in economic reform. Nevertheless, they may be the best approach in the cases for which expression of market forces as the allocative mechanism is too implausible.

The diffusion theory of household acquisition of durables models the triggering of a decision to purchase when a household reaches a threshhold level of income; otherwise no purchase. For the entire population, the result of this binary choice is an "increasing S-shaped" (sigmoid) curve of durable ownership as income increases, with the "kink" or "bend" of the sigmoid curve at the threshold level of income. Before growth, few households have purchased; as the economy grows over time the average income

increases so that the bulk of households move through the bend. The sigmoid appears both in an income plot of durable ownership and in a time trend.

The diffusion theory is an application of Engle curves with no articulation of a behavioral causality other than income level or distribution, Nevertheless, the sigmoid curve is a significant indicator of otherwise unobservable flows. Households may be experiencing large but hidden distortions such as the frustration of wealth formation for lack of adequate financial instruments, or they may be recipients of substantial non-pecuniary income.

For example, during the tightened post-June 1989 period, price and wage controls would suggest a slowing of the growth of consumption, and throughout the entire 1980s the still large proportion of expenditure devoted to foodstuffs would suggest a long distance yet to the acquisition of "luxury" consumer durables such as entertainment electronics. Yet, during these periods there were multiple waves of urban buying sprees of <u>remenhuo</u> ("hot-door goods" or "hot items")--precisely the type specified by the diffusion theory. Such sprees included basic consumer appliances, consumer electronics, multiple waves of successively more luxurious clothing, furniture and interior decoration, and has even begun to push into personal transportation despite tight administrative controls (motorcycles) and sheer physical constraints (automobiles). The diffusion theory can serve to empirically--albeit indirectly--verify the anecdotally familiar but less-readily documentable enterprise- level distribution of

nonpecuniary real income in the form of foods, increased housing, and so forth.

The shape of the sigmoid curve also suggests a ready-if-rough measure of income distribution: the sharper and more distinct the curves are, tending toward a right-angled step, the more equal the distribution of income, while a less equal distribution results in a slower diffusion and a long, flat profile.

In a diffusion model, the least squares method is applied to the logit model of nonlinear probability in binary choices. The only data requirements are income level and durable ownership. The development of techniques in the modeling of demand for durables as a binary choice is reviewed and summarized in Deaton and Muellbauer (1980), and structure and derivation of the logit model is clearly stated by Kmenta (1986).

Microanalytic simulation models the behavior of a large segment of an economy by specifying event probabilities for causal microeconomic variables in the sample in combination with econometric modeling of the decision relationships. "Blocks" represent parts of the system such as the demographic processes of birth, family formation/dissolution, migration, and death, and the economic processes of labor force participation, employment, wages, taxes, transfers, consumption, saving and wealth. The "blocks" are linked by an input-output relationship. The techniques have only recently been developed in pioneering works by Orcutt and others (Orcutt 1976) at the Urban Institute in Washington, D.C.

A research desk under the Development Research Center (DRC) of the State Council in Beijing has adopted the technique of microanalytic simulation for social security demand. The desk is charged with producing prognoses of the demand for social security in light of demographic projections and making policy recommendations for the implementation of a social security system. China's urban population receives significant social security transfers (among other transfers) from the traditional state-owned enterprise system. The reassignment of responsibility for social security, alone, not to mention the forecasted increased dependency ratio, adds further complexity to the already staggering potential problems of ownership reform or other effort to restructure industry.

Data

A significant set of urban household data comes from the annual Urban Residents' Household Income and Expenditure Sample Surveys ("urban surveys") conducted by the State Statistical Bureau (SSB) in Beijing. The SSB has an interesting and substantial history of survey activity. Analysis of data collected previous to the 1980s, is inhibited by a lack of continuity in the choices of indicators, measurement techniques, reporting method, and even degree of activity. By the early 1980s, however, the SSB substantially standardized and upgraded its work.

The method and coverage of the urban surveys since 1980 is consistent, well-documented and explained (Bowen 1992, SSB 1985).

Although the dissaggregated individual household reports have not been made available to this researcher, the city-level aggregated data are sometimes published or otherwise available from the SSB. A comprehensive annual rural survey reportedly exists but has not been made available to the extent of the urban survey. A few non-Chinese researchers have gained access to some less aggregated forms of consumption survey data through "resurveys" by the SSB and research institutes in cooperation with outside funders. The possibility of dissaggregated data availability increases as Chinese colleagues become increasingly interested in the adoption of quantitative analysis methods.

At the aggregate level, the number of observations is sufficient to provide statistical significance. For example, in 1985, one hundred and six cities reported price and expenditure data for fifty types of nondurable consumer goods. Purchases of sixteen types of durables and ownership rates for twenty-nine types of durables are reported. The sample size in each city varies, but it is reported, so the heteroskedasticity may be--and is--corrected for.

The individual commodity categories are reported consistently from year to year. In the study of the demand for nondurable consumption they are used to compute "composite commodities" according to major types of nondurable: **staples** (grains and food oils), **nonstaples** (all other foodstuffs), **vices** (alcohol and tobacco), **clothing** (including ready-made clothes, fabrics, and shoes), and other **daily** items (nonclothing, noningestible

household basic supplies--soaps, detergents and cookware).

The construction of composite commodities, and their quantities and prices requires an assumption that the components are "like-goods" in regard to price movements; in a competitive equilibrium both demand and supply must be considered. Here, it is not necessarily the case that consumers' choices are clearly transmitted back through the production process. To some extent, the veil of state ownership and non-price allocation mechanisms serve as a buffer between consumer choices and industry, commerce, and especially finance and investment. In this study, the grouping of "like-goods" from the consumers' perspective into composite commodities is the best choice that can be made, and the approach is both typical of comparable empirical studies and consistent with theory.

Estimation and Results, Part I: Demand for NonDurable Consumption

OLS estimates of the parameters of the simultaneously-determined demands for each of the five composite commodities were obtained for each of the five years 1983, 1984, 1985, 1986, and 1987. The estimates are reported in Tables A.1 through A.5 in Appendix A. T-statistics are reported for each coefficient. The R^2 is presented for each estimated equation, and the sample average values are included for the purpose of calculating the elasticities at sample means. All but two of the twenty-five coefficients are significant to the 0.99 level except for expenditure in staples in 1983 (significant at 0.80) and

expenditure on daily items in 1987 (insignificant at 0.80).

Most of the twenty-five own-price coefficients are significant at some level, although vice and daily items drop below the 0.80 level of significance for several years. The expenditure shares of the commodities with relatively insignificant coefficients is very small--the smallest in the entire nondurable consumption bundle, and in any case the core results lie in the expenditure elasticities which are computed without reference to the price coefficients. These coefficients are primarily of use to derive the point elastiticities and have only a limited direct economic interpretation, i.e. as subsistence quantities.

Expenditure and price elasticities computed from the OLS estimates of LES price and expenditure coefficients for each of the years 1983, 1984, 1985, 1986, and 1987 are reported in Tables B.1 through B.5 in Appendix B.

The pattern that emerges shows expenditure elasticities that are consistent with Engle's Law in the context of utility-maximizing consumer behavior. **Staple** foodstuffs have a relatively low expenditure elasticity indicating that they are a necessity relative to **non-staple** foodstuffs, which have a relatively higher expenditure elasticity. The expenditure elasticity of **staples** indicate that it is an inferior good during 1983, but not thereafter. **Non-staples** drop from being clearly in the luxury category during 1983 to having an expenditure elasticity barely larger than one and even dropping into the necessity category during 1986. For practical purposes, the expenditure elasticity

of **non-staples** is probably not much different from unity except during 1983 when it is much larger (indicating luxury status). The highest expenditure elasticity given is for **vices** during 1983 through 1985, indicating that the contents of this composite (tobacco and all types of liquor, wine and beer) are relative luxuries, though these elasticities may not be significantly different from that for **clothing** which has the second-highest elasticity of expenditure in those years and overtakes **vices** in 1986 and 1987 as the highest expenditure elasticity. **Daily** items (soap, detergent, and kitchenware) move from the "luxury" category during 1983 and 1984 to the "necessity" category during 1985 through 1987.

Price Elasticities

Note that all of the own-price elasticities are negative--the demands are downward sloping. Most of the goods are own-price inelastic (the absolute value of the elasticity is less than one); vices and daily items have unit or elastic price elasticity of demand during some years. These composite goods for which own-price elasticity is relatively elastic have a negative estimated own-price coefficient in the respective OLS equation during those years.

The relative ranking of the own-price elasticities' absolute values follow those of the expenditure elasticities. This result is not a surprise, rather it is a foregone result given the LES structure and reasonable data, and is discussed in Bowen (1992)

Nevertheless, the major contributor to the potential dominance of this linear relationship by expenditure information is found in situations where the real expenditure information variation dominates relative price information variation in the data, apparently a frequent problem with time series data. In this study there is a relatively high degree of variation in the price data compared to the real expenditure data. Thus, the own-price elasticities in this cross-sectional analysis will be no less meaningful than is generally the case for many of the ELES (Extended Linear Expenditure System), LES and flexible form system studies which use time series data, if not more so.

Cross-price elasticities are mostly negative; these are between own-price inelastic goods. These cross-price elasticities are small indicating weak complementarity between the respective composites. This is intuitively appealing given that the composites are basic categories of nondurable consumption. For most years, the cross-price elasticities for changes in the demands for other goods with respect to changes in the price of **vices** are very small positive, indicating a weak substitute relationship. However, it is important to emphasize that no firm conclusions should be drawn regarding the complement or substitute relationships between the composites. These are system-determined results given the relatively elastic own-price demand for **vices** during those years (and the relatively inelastic own-price elasticity of the rest of the composites).

Trend in the Elasticities

There are two discernable trends in the expenditure elasticities over the span of the period 1983 to 1987. These are the transition of daily items from luxury towards necessity and the same but slightly later and weaker transition on the part of nonstaple foodstuffs. However, over the entire period 1983 to 1985 the overall relationships between the elasticities are generally credible and generally consistent with theory of consumer behavior in markets and previous empirical studies. If the reforms or some other policy had a dramatic or shocking impact on the consumers' ability to express their demands, there might have been some larger changes observable in the general configuration of the elasticities. The changes actually observed are most likely explained by the existence of relatively steady market behavior by the Chinese urban households.

Comparison with Elasticities Found by other Studies

One further point of interest are any potential quantitative or qualitative differences between the elasticities calculated in this study compared to those obtained for other countries (Goldberger et al. 1970, Lluch et al. 1977, and others) and to those from other studies of Chinese or other urban household data (Van der Gaag 1984, Li et al. 1985, Hu et al. 1985, Lewis et al. 1989, Chern et al. 1989). To the extent that there are overall similarities, the generality of consumer behavior to the behavior of Chinese urban households and the underlying conditions is

confirmed. Care must be taken regarding any conclusions made based on cross-country comparison, especially in consideration of differences between the specific design of the various systems used for estimation, and differences between the economies of China and those of the countries of comparison in the cases where the comparisons are cross-country. Regarding the estimated systems, the differences lie in the composition of the commodity composite categories included and, more importantly, (1) the inclusion of saving and durables in many of the studies and in particular the structural inclusion of saving in those which use the ELES and (2) in some of other studies the introduction of dynamic issues by the use of time series data. Nevertheless, general observations may be drawn through qualified comparison in recognition of these differences.

Comparison with several empirical studies discussed below finds that the present study differs from previous studies in regard to one or more of: data source, data aggregation, data timespan, data quality, use of cross section or time series or pooled cross section and time series data, choice and/or coverage of composite commodity categories, choice of model, and degree of imposition of restrictions. Insofar as only one or a few of these conditions differ, the computed elasticities of expenditure are surprisingly comparable and robust across periods, some models, some variation in commmodity categorization and even countries at comparable developmental levels and sometimes even at different levels. However, if many or most of these conditions

differ then the elasticities of expenditure may be notably different. The demand elasticities of price are more sensitive to changes in conditions of analysis, but there is some comparability between studies with close structural similarities.

Goldberger and Gamaletsos' (1970) cross-country comparison of consumer expenditure patterns used time series data and two different demand systems. The time series were for 1948-1959 aggregate annual data from thirteen members of the Organization for Economic Cooperation and Development (OECD), and each country's series was used in a separate run for each of the models. The commodities were aggregated into five groups: Food, Clothing, Rent, Durables, and Other. As with the present study, Goldberger and Gamaletsos separate the saving decision, but their inclusion of wealth-formation related housing (Rent) and Durables is notably different from the approach in the present study. Also notably different is their use of the time series to estimate the systems. The demand systems used are the LES and a constant elasticity demand system used by Houthakker (1965). Their stated goal is to explore the determinants of variation in the composition of consumer expenditure. They implicitly include choice of demand system in "determinants" so that the study is comparing consumption patterns across models as well as consumption patterns across countries. Toward these ends they estimate and compare the two systems. Noteworthy is their conclusion that despite slightly inferior "goodness of fit," overall the LES retains a high degree of general usefulness in the analysis of consumption patterns.

Within each country, variations in consumption budget composition are explained by the determinants but, although the authors carefully acknowledged the parameters' variation across countries, said variation was not particularly well understood by the study. In any case, the LES income elasticities for Food and Clothing from most of the thirteen OECD countries tended to be comparable in ranking and magnitude to those in the present study, but those from four countries (Canada, Denmark, Italy, and Luxembourg) were not. Uncompensated and compensated own-price elasticities for Food and Clothing from the OECD countries were not comparable to the present study. In general, with the only exceptions being Durables in Denmark and Luxembourg, demand for everything was extremely price-inelastic. This latter result might be understood in light of the use of time series, and the general tendency of this type of data to have variations in relative prices which are relatively small and variations in expenditures which are relatively large. The study did test and reject the hypothesis that parameters are the same across all countries by converting all currencies to purchasing power equivalents and fitting a regression to pooled data over all time periods and countries. This latter finding in and of itself is an argument against making any cross-country comparisons.

Lluch, Powell and Williams (1977) use the ELES together with three types of data source to make a study of household demand in developing countries. National income accounts average annual data over the period 1955-1968 (giving fourteen observations) from

seventeen countries is used separately for each country in a system of demands for eight composite commodities and saving. Aggregated 1963-1972 annual survey cross section data from South Korea pooled over time and classified into five commodity categories (food, clothing, housing, fuel and light, and other--including tobacco, education, transport, and other services) distinguishing between rural and urban sectors of the population is used to study household behavior differences across sectors. Cross section data on individual households in Korea, Mexico (urban and rural, 1968), Yugoslavia (rural, 1972), and Chile (urban and rural, 1964) and one city each in Colombia, Ecuador, Peru and Venezuela are used to explore the effects of determinants other than income and price on household behavior, including determinants such as demographic characteristics and location. In the Mexico case the composite commodities are food, clothing, housing, durables, and other; in the Chile case the composite commodities are food, rent, and other; and in the case of Yugoslavia the composite commodities are food, clothing, housing, fuel and electricity, durables, and other. By definition the ELES included saving simultaneously with the rest of the household consumption decision process. As with the Goldberger and Gamaletsos study, in the study by Lluch et al. the ranking and magnitude of elasticities of expenditure on food and clothing are roughly comparable to the study at hand. The same is the case for the urban Korean households, the urban Mexican households, and young Chilean urban households. Again, however, the own price

elasticities in general were not comparable to the present study. In the study by Lluch et al. the various inclusions of fuel and electricity, and of wealth-formation related housing, rent, durables and by definition saving is notably different from the approach in the present study. Also notably different is their use of the time series to estimate the systems. In summary, to recommend comparison, the Lluch study has only that its goal in part is the study of urban household consumption behavior of a group of countries some of which are low income and in that regard comparable to the case of China in the 1980s.

Van der Gaag (1984) used the ELES and Chinese peasant household income and expenditures data from Hubei Province (1981 and 1982) aggregated into seven income classes and the Beijing municipalities (1982) aggregated into nine income classes. The stated purpose of his study is to develop a prognosis for the development of consumption patterns resulting from continuing economic growth and make projections for the growth of the various consumption categories. In the Hubei data there are five composite commodities; food, clothing, fuel, housing, and daily articles. In the Beijing data there are six composite commodities; food, clothing, fuel, housing, non-commodities and daily articles, and food is also broken down into the categories of grain, non-staple, cigarettes etc., and other. Van der Gaag did not have explicit price information and chose to generate price elasticities of demand using only the expenditure information and through the structure of the model. The nature of the ELES model's implicit

inclusion of saving, the rural and geographically narrow source of the data, the differing composite commodity coverage, and in particular Van der Gaag's inclusion of housing which is well known to be rationed by non-price allocative mechanisms, all place severe limits on the comparability of Van der Gaag's results to the present study. Nevertheless, it is noteworthy that in ranking and order of magnitude the expenditure elasticities computed from ELES for grain, non-staples cigarettes etc., and clothing ARE not entirely dissimilar to the early period (1983, 1984) LES estimates for the analogous categories in the present study. However, as stressed above, the studies' methods and coverage are fundamentally different. This is reflected more in the price elasticities where Van der Gaag's ELES estimates do noticeably differ from those generated by the present study.

Li et al. (1985) used the ELES in an otherwise very comparable study of the Beijing urban household income and expenditure behavior. 1982 cross section data in nine income categories from a survey of one thousand and two hundred Beijing households is used to estimate expenditure and price elasticities for the composite commodities food, clothing, fuel, articles of everday use, and non-commodities (not including rent). The expenditure elasticities of demand computed from the ELES estimates for food and clothing are comparable in ranking and magnitude to the elasticities for grain and non-staples and clothing in the present study. However, the use of ELES and differences in the coverage of composite commodities separate the Li et al. study from the

present study despite its comparable data source.

Hu et al. (1985) use constant elasticity of expenditure and household size Engle curve functions together with data from 1982 and 1984 urban household surveys conducted in Tianjin City in China, to estimate coefficients for the four composite commodities food, clothing, housing and fuel, and household supplies. It is noteworthy that despite the very different structure of this model and the composite commodities the relative ranking and magnitude of the expenditure elasticities of demand for food and clothing are comparable to those found in the present study.

Lewis and Andrews (1989) analyze rural and urban Chinese household data from the years 1982 to 1984 using the LES and the ELES respectively. The annual rural data is aggregated to province, but in light of the exclusion of the rural sector from the present study their rural results are not addressed here. The annual urban data is completely aggregated into one observation each year for each of the five composite commodities food, clothing, daily articles (including non-food, non-durables and many durables), other commodities (including reading materials and medicines), and non-commodities (including housing, fuels utilities, transportation and communications). The price indices and the expenditure data are culled and constructed from diverse and numerous sources. The sources and highly aggregated nature of the pooled times series data, the extensive nature of the composite commodity categories, and the use of the ELES all notwithstanding, the expenditure and own-price elasticities of

demand computed from the estimated coefficients in ranking and magnitude bear close comparison to those found in the present study insofar as the analogous categories of composite commodities exist.

Chern and Wang (1989) use the AIDS with rationing model together with annual Chinese urban household from 1981 through 1987 nationally aggregated to six income levels. The composite commodities are in the eleven categories of goods and services; grain, non-staple food, tobacco, liquor and tea, other foods, clothing, durables and articles of daily use, durables and articles for culture life and recreation, medicine and medicinal articles, fuels, housing rent, and services. The purpose of the Chern and Wang study is to investigate the impacts of [non-price] rationing of some of the objectives of consumer expenditure--housing, fuels and [some] food grains--on the consumption of food and other consumer goods and services by urban Chinese households during the reform period. Chern and Wang use OLS to estimate the approximate AIDS equations using the pooled (six income levels) time series data, and apply additional procedures to treat for heteroskedasticity and serial correlation. They also applied SUR to the AIDS with rationing in order to estimate under the symmetry restriction. Regardless of whether or not the estimations were unconstrained, or constrained to homogeneity alone or constrained to both homogeneity and symmetry, the expenditure elasticities of demand were about the same. These computed elasticities were not particularly comparable to those

obtained from the present study, and the price elasticities were both different depending on level of restriction and dramatically different from the present study. One of the stranger results was the report of a positive own-price elasticity of demand for clothing under the homogeneity restraint--meaning that in this demand system the demand for clothing is upward sloping. This latter result need not be taken too seriously since the imposition of homogeneity of demand in a system being estimated with time series data is unreasonable a priori as discussed by Bowen (1992). It does however reemphasize the importance of careful choice of model in consideration of the actual nature and institutional context of the data. In general, the differences between the results found by Chern and Wang are not at all surprising given the large differences in composite composition, model, aggregation and the use of time series in the Chern and Wang study.

Conclusions, Part I: Demand for Non-durable Consumption

In general, the results in the present study are credible by comparison with other studies. However, given the theoretical basis of the model design for the present study, explained by Bowen (1992), it would be inappropriate to make too close of a comparison between the empirical results of other studies and the present study. Goldberger and Gamaletsos used LES but for time series and composities including nondurables, durables and housing. Lluch et al., Van der Gaag, Li et al., and Lewis and Andrews used ELES which includes saving behavior. Hu et al. use a

constant elasticity Engle curve, while Chern and Wang use the rationed AIDS (RAIDS) model with pooled cross section and time series data and composities including nondurables, durables and housing. The sensitivity of results to the choice of model, commodity categorization and aggregation of data is particularly highlighted by the contrast between the present study and the results found in the studies by Chern and Wang, by Lewis and Andrews, by Li et al. and by Van der Gaag, all five of which, to varying degrees, used data from the same or overlapping sets of Chinese cities and the same or overlapping years.

Implications, Part I: Demand for Non-Durable Consumption

Over the entire period 1983 to 1985 the overall relationships between the elasticities are generally credible and generally consistent with theory of consumer behavior in markets and previous empirical studies. The results serve to confirm the central hypothesis of this study. That is, under the structural reform of the urban Chinese consumer nondurable goods sector with implementation of effective markets--price rationing of goods--statistically significant elasticities which are consistent with Engle's Law and utility maximizing consumer behavior are observed. Given the assumption that Chinese consumers are rational and that their motivations are essentially similar to that observed of consumers elsewhere, urban consumers could be behaving as participants in fully-functional retail markets for nondurables. In turn, this allows nonrejection of the null hypothesis that the

sector-by-sector partial reforms could be successful and lead toward the stated goal of increasing economic efficiency. Sector-by-sector partial reforms were the path pursued by the Chinese during the 1980s, with the inception of largely free retail consumer markets officially announced in the 1984 urban reform. During the period under study, the urban industrial production and commercial distribution structure fundamentally remained largely unreformed as evidenced by the status quo in actual ownership, core management, and political structure, shielding the urban households from any large short-term supply shocks.

Certainly, the discovery of significant demand elasticities which could be consistent with the utility-maximizing consumer behavior in free markets does not alone confirm the existence of those markets. It does however serve to lend strong support the wealth of descriptive and institutional evidence of the effective functioning of these markets and serves as support for the proposition that the reforms by sector-by-sector partial marketization may be sucessful, and that in particular the consumer non-durables retail commerce component of the post 1984 urban reforms in the PRC actually produced the stated economic goal--increased economic efficiency attained through the expression of consumer sovereignty. This part of the study has investigated the immediate empirical results of the reform process. The aspiration on the part of the Chinese policymakers--to achieve increased allocative efficiency--is seen

to have been realized during this period. At the same time it is recognized by this study that the intra-sectoral static efficiency of urban household consumption of non-durable commodities, while a necessary condition of general economic efficiency, is not a sufficient condition.

Further Work

Further analyses of national urban data in hand from 1988-90, and for 1981-1986 from cities in the province of Shaanxi, is currently underway, and there are prospects to obtain dissaggregated data under a cooperative research scheme. The results should serve to significantly enrich the picture.

It is also the author's intent to use the data in hand to pursue the avenues of analysis suggested in "Approach, Part II:..." regarding the relatively straightforward diffusion theory of durable acquisition and the more involved microanalytic simulation technique.

Conclusions

The approach of examining estimations of carefully defined functions in search of evidence of the expression of urban household consumer demands has been rewarded by a strong "non-rejection." Yet, the necessarily limited nature of the realm that was analyzed and the reasons for the delimitation alone raise immediate questions about the extent of market allocation. Although consumer non-durables are fundamental to economic

performance and have been found to be allocated through the action of market forces during the period studied, there remain the significant--and in some regards more serious--questions over the role of market allocation in the categories of consumer durables, housing, health, education, wealth accumulation, and inter-temporal consumption. Pending further refinement in the financial system and ownership, and address of the overwhelming issue of the substantial surplus of rural labor and the looming rural population, it is difficult to see how these categories can be brought closer to market allocation, without serious negative repercussions for stability in turn affecting future growth and economic welfare. Nevertheless, the grounds for optimism exist in the accomplishments since 1978.

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Appendix A

Ordinary Least Squares Estimates of LES Coefficients

Table A.1 OLS Estimates of LES Coefficients and T-statistics, 1983 Data(a)

Composite Commodity	Estimated Coefficients		Sample Average Values			
	$\hat{\beta}_i$[b]	$\hat{\gamma}_i$[c]	$\bar{p}_i$	$\bar{q}_i$	$\bar{p}_i\bar{q}_i$	$\bar{R}^2$[d]
Staples	−0.070 (1.46)	1555.0 (3.41)	0.2	3071.3	614.3	0.97
Nonstaples	0.689 (9.42)	−1462.0 (2.61)	1.2	1001.0	1221.2	0.99
Vices	0.131 (7.34)	−17.15 (1.42)	1.7	131.9	222.0	0.97
Clothing	0.234 (4.75)	13.40 (0.92)	9.6	54.1	516.9	0.97
Daily	0.015 (2.26)	−18.53 (1.27)	0.8	47.5	35.6	0.83

[a] 25 degrees of freedom; t-statistic absolute value reported.

[b] These are the coefficients on total expenditure.

[c] These are the coefficients on own price; t-statistic is for the unrestricted coefficient.

[d] Each $\bar{R}^2$ reported is for the OLS-estimated equation with the composite commodity corresponding to the given row as the explained variable.

Table A.2 OLS Estimates of LES Coefficients and T-statistics, 1984 Data(a)

Composite Commodity	Estimated Coefficients		Sample Average Values			$\bar{R}^{2d}$
	$\hat{\beta}_i$[b]	$\hat{\gamma}_i$[c]	$\bar{p}_i$	$\bar{q}_i$	$\bar{p}_i\bar{q}_i$	
Staples	0.103 (3.21)	−639.9 (2.40)	0.2	3440.4	653.7	0.92
Nonstaples	0.567 (18.10)	822.5 (4.27)	1.2	1030.0	1266.9	0.99
Vices	0.096 (6.44)	−11.44 (1.00)	1.7	147.0	249.9	0.91
Clothing	0.217 (8.74)	22.03 (3.25)	10.2	54.0	551.3	0.96
Daily	0.017 (4.24)	18.02 (0.54)	0.8	54.0	42.1	0.82

[a] 87 degrees of freedom; t-statistic absolute value reported.

[b] These are the coefficients on total expenditure.

[c] These are the coefficients on own price; t-statistic is for the unrestricted coefficient.

[d] Each $\bar{R}^2$ reported is for the OLS-estimated equation with the composite commodity corresponding to the given row as the explained variable.

Table A.3 OLS Estimates of LES Coefficients and T-statistics, 1985 Data(a)

Composite Commodity	Estimated Coefficients		Sample Average Values			$\bar{R}^2$[d]
	$\hat{\beta}_i$[b]	$\hat{\gamma}_i$[c]	$\bar{p}_i$	$\bar{q}_i$	$\bar{p}_i\bar{q}_i$	
Staples	0.069 (4.45)	491.7 (5.82)	0.4	1609.0	639.3	0.92
Nonstaples	0.574 (22.60)	−537.2 (8.30)	3.1	548.0	1678.0	0.98
Vices	0.107 (9.75)	−0.347 (0.06)	3.6	86.3	314.0	0.86
Clothing	0.241 (12.68)	24.19 (3.62)	11.6	62.2	720.0	0.93
Daily	0.009 (4.37)	66.10 (2.84)	0.2	185.3	44.4	0.75

[a] 100 degrees of freedom; t-statistic absolute value reported.

[b] These are the coefficients on total expenditure.

[c] These are the coefficients on own price; t-statistic is for the unrestricted coefficient.

[d] Each $\bar{R}^2$ reported is for the OLS-estimated equation with the composite commodity corresponding to the given row as the explained variable.

Table A.4 OLS Estimates of LES Coefficients and T-statistics, 1986 Data(a)

Composite Commodity	Estimated Coefficients		Sample Average Values			$\bar{R}^{2}$[d]
	$\hat{\beta}_i$[b]	$\hat{\gamma}_i$[c]	$\bar{p}_i$	$\bar{q}_i$	$\bar{p}_i\bar{q}_i$	
Staples	0.078 (4.26)	574.0 (5.53)	0.4	1660.6	655.0	0.89
Nonstaples	0.527 (22.50)	−562.7 (10.80)	3.3	609.4	2012.0	0.99
Vices	0.118 (9.89)	−1.29 (0.21)	4.0	100.2	353.0	0.85
Clothing	0.266 (14.80)	31.95 (4.68)	11.6	69.6	793.0	0.94
Daily	0.011 (4.24)	1.507 (0.44)	1.8	28.7	49.0	0.64

[a] 99 degrees of freedom; t-statistic absolute value reported.

[b] These are the coefficients on total expenditure.

[c] These are the coefficients on own price; t-statistic is for the unrestricted coefficient.

[d] Each $\bar{R}^2$ reported is for the OLS-estimated equation with the composite commodity corresponding to the given row as the explained variable.

Table A.5 OLS Estimates of LES Coefficients and T-statistics, 1987 Data(a)

Composite Commodity	Estimated Coefficients		Sample Average Values			$\bar{R}^2$[d]
	$\hat{\beta}_i$[b]	$\hat{\gamma}_i$[c]	$\bar{p}_i$	$\bar{q}_i$	$\bar{p}_i\bar{q}_i$	
Staples	0.078 (4.26)	574.0 (5.53)	0.4	1660.6	655.0	0.89
Nonstaples	0.527 (22.50)	−562.7 (10.80)	3.3	609.4	2012.0	0.99
Vices	0.118 (9.89)	−1.29 (0.21)	4.0	100.2	353.0	0.85
Clothing	0.266 (14.80)	31.95 (4.68)	11.6	69.6	793.0	0.94
Daily	0.011 (4.24)	1.507 (0.44)	1.8	28.7	49.0	0.64

[a] 99 degrees of freedom; t-statistic absolute value reported.

[b] These are the coefficients on total expenditure.

[c] These are the coefficients on own price; t-statistic is for the unrestricted coefficient.

[d] Each $\bar{R}^2$ reported is for the OLS-estimated equation with the composite commodity corresponding to the given row as the explained variable.

Appendix B

Elasticities Calculated from Ordinary Least Squares Estimates of LES Coefficients

Table B.1 Calculated Elasticities of Demand from OLS Estimates of LES Coefficients, 1983 Data(a)

Composite Commodity (*i*)	e_i	e_{ij} (e_{ii} on diagonals)				
		Composite Commodity (*j*)				
	x	Staples	Nonstaples	Vices	Clothing	Daily
Staples	−0.294	−0.458	−0.203	−0.003	0.015	−0.002
Nonstaples	1.463	−0.176	−1.454	0.016	−0.072	0.008
Vices	1.680	−0.184	1.053	−1.113	−0.076	0.008
Clothing	1.170	−0.141	0.807	0.013	−0.810	0.006
Daily	1.071	−0.130	0.743	0.012	−0.053	−1.385

[a]Elasticities of total expenditure (x) on this overall bundle as well as own price and cross-price elasticities.

Table B.2 Calculated Elasticities of Demand from OLS Estimates of LES Coefficients, 1984 Data(a)

Composite Commodity (*i*)	e_i	e_{ij} (e_{ii} on diagonals)				
		Composite Commodity (*j*)				
	x	Staples	Nonstaples	Vices	Clothing	Daily
Staples	0.440	−1.167	−0.159	0.003	−0.075	−0.0004
Nonstaples	1.219	0.054	−0.654	0.009	−0.101	−0.006
Vices	1.143	0.047	−0.389	−1.070	−0.086	−0.005
Clothing	1.080	0.048	−0.398	0.008	−0.681	−0.005
Daily	1.133	0.049	−0.410	0.000812	−0.09153	−0.672

[a]Elasticities of total expenditure (x) on this overall bundle as well as own price and cross-price elasticities.

Table B.3 Calculated Elasticities of Demand from OLS Estimates of LES Coefficients, 1985 Data(a)

Composite Commodity (i)	e_i	e_{ij} (e_{ii} on diagonals)				
		Composite Commodity (j)				
	x	Staples	Nonstaples	Vices	Clothing	Daily
Staples	0.359	−0.716	0.180	0.0001	−0.030	−0.002
Nonstaples	1.141	−0.067	−1.418	0.0004	−0.096	−0.005
Vices	1.138	−0.067	0.568	−1.004	−0.096	−0.005
Clothing	1.116	−0.066	0.557	0.0004	−0.705	−0.005
Daily	0.692	−0.040	0.341	0.0003	−0.057	−0.647

[a]Elasticities of total expenditure (x) on this overall bundle as well as own price and cross-price elasticities.

Table B.4 Calculated Elasticities of Demand from OLS Estimates of LES Coefficients, 1986 Data(a)

Composite Commodity (i)	e_i	e_{ij} (e_{ii} on diagonals)				
		Composite Commodity (j)				
	x	Staples	Nonstaples	Vices	Clothing	Daily
Staples	0.454	−0.681	0.223	0.0006	−0.044	−0.0003
Nonstaples	1.021	−0.062	−1.437	0.001	−0.097	−0.0007
Vices	1.283	−0.079	0.625	−1.011	−0.124	−0.0009
Clothing	1.279	−0.079	0.627	0.002	−0.663	−0.0009
Daily	0.846	−0.053	0.419	0.001	−0.083	−0.948

[a]Elasticities of total expenditure (x) on this overall bundle as well as own price and cross-price elasticities.

Table B.5 Calculated Elasticities of Demand from OLS Estimates of LES Coefficients, 1987 Data(a)

Composite Commodity (i)	e_i	e_{ij} (e_{ii} on diagonals)				
		Composite Commodity (j)				
	x	Staples	Nonstaples	Vices	Clothing	Daily
Staples	0.695	−0.689	0.413	0.006	−0.055	0.004
Nonstaples	1.099	−0.060	−1.443	0.009	−0.108	0.0005
Vices	0.792	−0.039	0.436	−1.071	−0.070	0.0003
Clothing	1.100	−0.061	0.673	0.009	−0.590	0.0005
Daily	0.455	−0.025	0.271	0.004	−0.044	−1.038

[a]Elasticities of total expenditure (x) on this overall bundle as well as own price and cross-price elasticities.