GEORG-AUGUST UNIVERSITAET GOETTINGEN

AN ALMOST IDEAL DEMAND SYSTEM FOR FOOD

BASED ON CROSS SECTION DATA: RURAL AND URBAN EAST JAVA, INDONESIA

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AN ALMOST IDEAL DEMAND SYSTEM FOR FOOD BASED ON CROSS SECTION DATA: RURAL AND URBAN EAST JAVA, INDONESIA

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ABSTRACT

1. This is a micro-data based study of demand for food in the framework of a static, utility maximizing, and partial model that enables the provision of knowledge on the interrelatedness among the competing commodity groups in a complete demand system.
2. The dynamics which took place in the economy of contemporary Indonesia has created an urgent need for policy makers and scholars of food and agriculture sector of this country to have a knowledge on the spending behavior of the households in their response on changing consumption determinants like income, relative prices, the introduction of new brands in manufactured foods, an intensifying advertisement, changing mode of retailing, etc., as well as the changes in the demography of households themselves. The need is reinforced, as Indonesia after enjoying two decades of economic booming was hit by a devastating economic crisis that broke out in July 1997, the ramification of which prevails until the time of study. The consequences of this crisis are manifold. Economically speaking, the crisis has (i) forced Indonesia to approach a market system that among others, liberalizes the previously intervened food market, (ii) set the purchasing power of the average Indonesian back to the level of ten years before (iii) also changed the prices relatively. Politically, the Indonesian government is now facing an era of decentralization. These factors in combination might change the consumption structure of different household groups in Indonesia. Additionally, it places an urgent need to conduct a study also with local specific perspective of consumption behavior.
3. Until today, the existing knowledge is deficient, because previous studies are limited to the estimation of single equation model based on an aggregated data. Due to the importance of the household as the decisive unit in consumption, and due to an increasing accessibility of micro data, this study used a dis- aggregate micro data set from the province of East Java, Indonesia.
4. Given that background, the objective of this study is firstly to find demand parameters for food groups under investigation, based on which one can analyze the effects of expenditure and price changes on demand of eleven food groups for different income groups in the province of East Java, Indonesia. Secondly, to demonstrates the use of the

study results for real policy questions about the food and agricultural sector. Thirdly, to evaluate the specific welfare effects of selected price policies for different income groups.

5. The brief exposition of the republic of Indonesia in a historical perspective indicates that Indonesia is an economy with heavy state intervention in the past and departing from this basic model is a matter of political pragmatism. Changing the economic structure reduced the role of agricultural sector in terms of GDP contribution, but it is still important for food provision and employment. Increasing income per capita per year in the country reduced slightly percentage of expenditure on food. Rice expenditure has a high share of total food expenditure in all household groups. Therefore, food policy in Indonesia has dominantly centered on rice.
6. This study employed the cross sectional household consumption/expenditure micro data set from the so called SUSENAS (the National Socio -Economic Survey), for the periods 1990, 1993, 1996 and 1999 representing the province of East Java, Indonesia. The consumption and income module of the SUSENAS survey covers all household expenditures during a week of enumeration with full specification of commodities. Listed in the questionnaires are 231 consumption items, for which data on quantities and values were gathered. The data set of each survey periods is collected from 5692 households (1990), 7638 households (1993), 8015 Households (1996), and 8552 households (1999) in urban and rural areas. The central Bureau of Statistics applied *the three-stage stratified sampling* for the SUSENAS. For food consumption the survey reference period was one week prior to the enumeration of data.
7. The theoretical framework of this study is the neo-classical consumer economics. Theory and the related methods are presented in order to justify the model used in this study. Some theoretical, empirical and pragmatical considerations have brought us to the decision to use the linearized approximation of an almost ideal demand system (LA/AIDS) model. It satisfies the axioms of choice, aggregates perfectly over consumers, has a functional form, which is consistent with household budget data, and simple to estimate and test the true restrictions of demand theory. It also combines the best of theoretical features of both Rotterdam and translog models. When Stone's index is used in the model it is termed as a linear approximation of almost ideal demand

system (LA/AIDS). The use of the concept of compensating variation suggests that results of demand estimation contribute well to the analysis of policy. Compensating variation is the compensating payment (amount of money) that leaves the consumer as well of as before the economic change. It may be positive or negative. It is positive, if the economic change makes consumer worse off, and negative, if the economic change brings betterment to the consumer.

8. Because compensating variation is money metric, its expression is dependent on an absolute expression in term of country's currency unit. This is less comparable. To avoid this, one can transform it in a relative term by using for example, price index, which is metric independent. Based on that, Fischer Ideal Price Index was used to approximate the welfare change. Fischer Ideal Price Index is a geometric means of Laspeyres- (P*L*) price index , $P_L = \sum_i w_i^0 \frac{p_1}{P_0}$), and the Paasche (P*P*) price index, $P_p = 1 / \left(\sum_i w_i^1 \frac{p_0}{P_1} \right)$. It is expressed algebraically as $= \sqrt{P_L . P_P}$. It represents a changing purchasing power as an approximation of welfare change.
9. The estimated equations for the LA/AIDS are summarized in table 6.2 to 6.9. For all the periods of surveys, covering urban and rural areas, there are 88 equations for the LA/AIDS. Eighty equations out of these 88 were estimated directly using SAS program the 6.12 edition, by applying the iterative seemingly unrelated regression (ITSUR) estimation procedure. The parameter estimates for the rest of 8 equations were recovered by using adding-up principle. In these models, the variation of budget shares of eleven food groups in the study areas are determined by (the own- and cross) prices, income level which is approximated by the weekly household's total expenditure on food, the income group of the households, and the household size accommodating the rest of demographical characteristics of the households. In total, 220 parameters in each of equation are resulted directly or indirectly from this estimation. Table 6.10 summarizes the estimation performance by presenting the number of statistically significant estimates out of 170 parameters in each equation that directly estimated in this study. As a matter of statistics, the worse performance of the estimation is represented by the one that give 55 per cent statistically significant estimates (table code 6.2: Urban90). The best estimation performance is exhibited by the one that

brought 78 per cent statistically significant estimates (table code 6.3: Rural90). The facts, that more than the half of parameter estimates in each equation system is statistically significant may be the basis to claim, that the model specification is appropriate. Also, direct observation on the results of estimation indicates that majority of parameter estimates are large relative to their standard errors. These deliver some degree of confidence to say that the estimates are reliable. These in all suggest that our hypothesis, as explicitly expressed in the LA/AIDS model, is supported by the data. That is to say, that food demands in the study areas are responsive to prices, total food expenditure level, income groups and the household size as measured from survey data.

10. The asymptotic likelihood ratio test on demand restrictions indicates that the result of the test is consistent with the previous common findings by other authors. That is, the homogeneity and symmetry restrictions were in most cases violated by the data. However, it does not necessarily mean, that the theory is wrong; it may be rather the case, that the data and model combined do not support the theory either because of data property, and/or model specification.
11. The signs of the AIDS parameters deliver information on the nature of the demand for food commodities. So, by inspection one can infer, those with negative expenditure parameters $\beta_i < 0$ are income inelastic, and those with positive parameters, $\beta_i > 0$ are income elastic. Observation on the AIDS estimates indicated that rice is in all cases income inelastic. Other commodities exhibited a mix performance depending on the areas and survey periods. Fish, meat, tobaccos and betel, and prepared food exhibited a generality of being income elastic. Other findings that support the intuition is that all food groups showed a negative own price elasticities. Most of commodity groups under investigation, with exception of Eggs and Milks, are own price inelastic. The fact, that the compensated own price elasticities are different clearly from those of the ordinary own price elasticities indicated that there is a demand effects in each of price change of the commodities groups being analyzed. Other food groups are responsive on the change of rice price. The reverse is not the case. In general, cross price relationship among the food groups are less influential. The inclusion of household size in the AIDS model for food is justified by the fact, that most of the parameter estimates representing household size were statistically significant. So for the majority of food

items it holds that an additional of household's member will cause some household expenditure to increase and others to decline to balance the household size variable. As the number of household member increases, households reduce their consumption of tobacco, fruits and vegetables, prepared foods, and some time, fish and meat. These reductions are made in order to increase the consumption of other categories with positive household size elasticities mainly rice, non-rice staple, and edible oil. The increase of household size definitely associated with the decline in the food quality consumed by the households. The consumption of cheap carbohydrate-rich food is mainly the strategy taken by households having a large membership.

12. The estimated demand parameters provide a complete and consistent framework for evaluating impacts of any government policy. The combination of direct rice- and indirect tobacco pricing policies has been used in this study to demonstrate the usefulness of the results of this study. The price of rice has an important impact on private household's spending pattern, because of its important influence on the household's budget. The policy exercise conducted in this study suggest, that liberalizing the market of rice will make households of all income groups better-off, and a combination of it with a tobacco-taxing (indirect pricing) will increase government revenue without harming so much the poor households.

ZUSAMMENFASSUNG .

1. Diese Arbeit ist eine Nachfragestudie, die auf den Mikro-Daten des Verbrauches für Lebensmittel und im Rahmen einer statisch, Nutzenmaximierend, und partielle Modell bearbeitet ist. Die Studie ermöglicht eine Bereitstellung von Information über das Zusammenhang zwischen den konkurrierenden Warengruppen in einer vollständigen Nachfrage System.
2. Derzeitige Wirtschaftentwicklung, die unter anderen wegen der im Juli 1997 ausgebrochene Krise ausgeprägt ist, hat eine dringende Notwendigkeit für die Politik und Wissenschaftler der Lebensmittel und Landwirtschaft dieses Landes um eine Information auf die Konsumsverhalten der Haushalte in ihrer Reaktionen auf die Änderung der Verbrauch determinierenden Faktoren wie Einkommen, Preisverhältnis, Einführung neuer Marken in Lebensmittelprodukte, Intensivierung der Anzeigen, Änderung im Modus des Einzelhandels, usw., sowie die Änderungen in demographische Faktor der Haushalte. Der Bedarf nach dieser Informationen sind um so großer, weil es nach im Juli 1997 ausgebrochene Wirtschaftkrise ein tief greifende Strukturwandel gibt, die vielfältige Folge mitgebracht hat. Diese Folge sind unter anderen: (i) Indonesien ist daran gezwungen, die Wirtschaft, einschließlicher Lebensmittelmarkt sich an einem Markt System zu orientieren; (ii) die durchschnittliche Kaufkraft des Volkes ist zu der Ebene der vor zehn Jahre zurück gegangen; (iii) Der Preisverhältnis verändert sich. (iv) Politisch gesehen, steht die indonesischen Regierung derzeit vor einer Ära der Dezentralisierung. Diese Faktoren konnte es dazu führen, der sich Struktur der verschiedenen Haushaltsgruppen in Indonesien zu ändern. Dazu ist es Notwendig, eine Studie mit den lokalen spezifische Sicht des Verbrauchs verhaltens durchzuführen.
3. Zu den Zeitpunkt ist die existierende Information unzulänglich, weil die vorherigen Studien wenn überhaupt da sind, lediglich nur auf Einzel Gleichung schätzende Modell begrenzt sind, und sie sind meisten basiert auf einen argregierten Datei. Auf Grund der Wichtigkeit des Haushalts als die entscheidende Einheit in Verbrauch und auf Grund einer wachsenden Erreichbarkeit von Makrodaten, hat diese Studie

einen disaggregierten Haushalt Mikrodatensatz von der Provinz Ost Java, Indonesien benutzt.

4. Die Studie hat folgende Ziele: Erstens, Nachfragenparameter für die untersuchten Lebensmittelgruppen zu finden, damit man die Wirkung einer Preisänderungen auf die Nachfrage der Lebensmittelgruppen für verschiedene Einkommengruppen in der Provinz Ost Java, Indonesien analysieren kann. Zweitens, um zu zeigen, wie man die Studienergebnisse für real politische Grundsatzfragen um die Lebensmittel und die Landwirtschaft nutzen kann. Drittens, um die spezifischen Wohlfahrtwirkungen der ausgewählten Preispolitik für verschiedene Einkommengruppen zu bewerten.
5. Ein historisch perspektive Überblick über die Republik von Indonesien zeigt an, dass Indonesien eine Wirtschaft mit schwerer staatlicher Einmischung in der Vergangenheit ist, und eine Änderungen von diesem grundlegenden Modell eine Sache des politischen Pragmatismus ist. Die ändernde Wirtschaftstruktur des Landes hat dazu zuführen, das die Rolle der Landwirtschaft im Brutto Inland Produkt (BIP) Beitrags verringert ist, obwohl diese noch wichtig ist für die Lebensmittelsevorkehrung und Anstellung. Steigende pro Kopfseinkommen pro Jahr auf dem Land hat nur geringe Minderung des Verbrauches auf Nahrungsmitteln zu Folge. Reiskonsum hat einen hohen Anteil der gesamter Nahrungsmittelausgaben in allen Haushaltgruppen. Daher hat sich Nahrungsmittelpolitik in Indonesien vorherrschend noch auf Reis konzentriert.
6. Dieses Studie hat den disaggregierten Mikrodatensatz von Haushaltsausgaben bearbeitet. Dieser Datensatz ist von so genannten SUSENAS (die nationalen Sozial—Wirtschaftliche Datenerhebung), für die Perioden 1990 1993, 1996 und 1999 von Ost Java Provinz Indonesien eingestellt. Der Ausgaben und der Einkommenmodul von dem SUSENAS Verhebung bedecken alle Haushaltausgaben in einer Woche der Aufzählung mit voller Spezifikation von Waren. Aufgeführt in den Umfragen sind 231 Verbrauchwaren, die Daten auf Quantitäten und Werte gesammelt wurden. Der Datensatz für jede Verhebungsperiode ist von 5692 Haushalten (1990), 7638 Haushalten (1993), 8015 Haushalte (1996), und 8552 Haushalte (1999) in städtischen und ländlichen Gebieten gesammelt. Die zentrale Behörde der Statistik hat die

dreistufige stratifizierte Probe für den SUSENAS angewandt. Für Verbrauchsdaten der Nahrungmittels war das Zeitreferenz eine Woche vor der Aufzählung von Daten.

7. Die theoretische Grundlage dieser Studie ist die Neonklassische Verbraucherwirtschaft. Theorie und die verwandten Methoden sind präsentiert, um das in dieser Studie gebrauchten Modell zu rechtfertigen. Wir haben aufgrund einige theoretisch, empirisch und pragmatische Berücksichtigungen die Entscheidung getroffen, die linearen Annäherung von der nahezu idealen Nachfragensystem ((LA/AIDS) Modell zu benutzen. Es befriedigt die Axiome der Wahl, argregiert perfekt über die Verbrauchern, hat eine praktische Form, die verträglich mit Haushalthaushaltdaten ist, ist einfach zu schätzen, und kann prüfen die wahren Einschränkungen der Nachfragentheorie. Es kombiniert auch den Beste von theoretischen Eigenschaften von sowohl Rotterdam als auch Translog Modelle. Wenn man der Preisindex von Stone im Modell anwendet, ist das Modell als eine Lineare Annäherung der Nahezu idealer Nachfrage System (LA/AIDS) genannt. Der Gebrauch des *Compensating Variation* (CV) Konzeptes schlägt vor, dass die Ergebnisse der Nachfragenschätzung gut zur politische Analyse beitragen kann. Das CV ist die Entschädigungszahlung (Betrag des Geld) der den Verbraucher ebenso wohl als vor der wirtschaftlichen Änderung verlässt. Es mag positiv oder negativ sein. Es ist positiv, wenn die wirtschaftliche Änderung dem Verbraucher schlechter drauf macht, und Negativ, wenn die wirtschaftliche Änderung dem Verbraucher Verbesserung bringt.
8. Da das CV Geld metrisch ist, ist sein Ausdruck abhängig auf einem absoluten Wert der Währung des Landes. Dies ist weniger vergleichbar. Um dies zu vermeiden, kann es in einem relativen Begriff durch Gebrauch zum Beispiel, eines Preisindexes, umgestalten werden. Dadurch ist es metrisch unabhängig. Auf diesen Grund, wurde *Fischer Idealer Preisindex* in dieser Studie benutzt, der Wohlfahrtsänderung anzunähern. Fischer Idealer Preisindex ist ein geometrisches Mittel des Laspeyres- (PL) Preisindex, $P_L = \sum_i w_i^0 \frac{p_1}{P_0}$, und der Paasche (PP) Preisindex $P_p = 1 / \left(\sum_i w_i^1 \frac{p_0}{P_1} \right)$. Es ist algebraisch als $\sqrt{P_L} . P_P$ .ausgedrückt. Es vertritt eine Änderungskaufkraft, die als eine Annäherung der Wohlfahrtsänderung gilt.

9. Die geschätzten Gleichungen für das LA/AIDS sind in Tabelle 6. 2 zu 6. 9 zusammengefasst. Für die ganzen Perioden von der Verhebungen, die städtische und ländliche Gebiete bedecken, gibt es 88 Gleichungen für das LA/AIDS. Achtzig Gleichungen aus diesen 88 wurden direkt durch das SAS Program (die 6,12 Ausgabe) geschätzt, durch die Verwendung der iterativen scheinbar nicht verwandten Regression (ITSUR) Schätzungsverfahren. Die Parameterschätzungen für den Rest von 8 Gleichungen wurden von Gebrauch der Prinzip summierung *(add up principle*) wiedererlangt. In diesen Modellen wird die Veränderung der Budgetanteilen von elf Nahrungsmittelsgruppen in den Studiegebieten von den folgenden Faktoren bestimmt: Preise (das eigene- und kreuzt Preis), Einkommensnivue, die vom totalen Ausgaben der wöchentlichen Budget auf Nahrungsmitteln angenähert werden, die Einkommengruppe von den Haushalten, und der Haushaltgröße, die den Rest des demographische Merkmale vertritt. Insgesamt sind 220 Parameter in jeder Gleichung, die direkt oder indirekt von dieser Schätzung resultiert. Tabelle 6.10 fasst die Schätzungsleistung durch die Vorlage der Anzahl der statistisch signifikante Schätzungen von 170 Parametern der einzelnen Gleichungen zusammen, die direkt in dieser Studie geschätzt wurden. Statistik gesehen, wird die schlechter Leistung der Schätzung von einer vertreten, die 55 Prozent statistisch signifikante Schätzungen gibt (Tabelle 6.2: Urban90). Die beste Schätzungsleistung wird von einer vertreten, die 78 Prozent statistisch signifikante Schätzungen gibt (Tabelle 6.3: Rural90). Die Tatsachen, dass mehr als die Hälfte von Parameterschätzungen in jedem Gleichungssystem statistisch signifikant sind, gibt einen Grund zu beanspruchen, dass die Modellspezifikation passend ist. Auch direkte Beobachtung auf den Ergebnissen der Schätzung zeigt an, dass Mehrheit von Parameterschätzungen großer sind, im Vergleich mit ihren Standard Fehlern. Die liefern ein gewisses Maß an Vertrauen zu sagen, daß die Schätzungen zuverlässig sind. Diese in allen vorschlagen, daß unsere Hypothese, wie ausdrücklich in der LA/AIDS Modell, von der Daten unterstuzt wird. Das ist zu sagen, dass die Nachfrage nach Nahrungsmittel in den Studiensgebieten ansprechend ist zu Preisen, totale Ausgaben für Nahrungsmitteln, Einkommengruppen und die Haushaltgröße.
10. Die asymptotische *Likelihood Ratio* Test auf die Nachfrage Ristriktionen zeigt an, dass das Ergebnis der Prüfung im Einklang mit der früheren algemeinen Ergebnisse von

anderen Autoren steht. Das ist, der Homogenität und der Symmetrie Restriktionen in den meisten Fällen von der Daten übertreten worden sind. Es bedeutet aber nicht unbedingt, dass die Theorie falsch ist. Es kann der Fall sein, dass die Daten und Modell nicht die Theorie unterstutzen kann entweder wegen der Dateneigenschaft, und/oder Modell Spezifikation.

11. Die Zeichen von den AIDS Parametern liefern Informationen über die Eigenschaften der Nachfrage nach Nahrungmitell. Man kann durch Besichtigung folgern, dass Waren mit negativen Verbrauchparameter ($\beta_i < 0$ a) Einkommen unelastisch sind, und diejenige, die mit positiven Parametern ($\beta_i > 0$, Einkommen elastisch sind. Beobachtung auf den AIDS Schätzungen hat angezeigt, dass Reis in alle Fälle einkommen unelastisch ist. Andere Waren haben eine Mischungsleistung ausgestellt, die von den Gebieten und Verhebungsperioden abhängen. Fisch, Fleisch, Tabake und *Betel*, und vorbereitete Speise haben eine Allgemeinheit ausgestellt, einkommen elastisch zu sein. Andere Ergebnisse, die im Einklang mit der Intuition haben, sind die Ergibnisse die angezeigt haben, dass alle Nahrungsmittelgruppen eine negative Preiselastizitäten besitzen. Meisten von der untersuchten Waregruppe, mit Ausnahme von Eiern und Milch, sind Eigenpreis unelastisch. Die Tatsache, dass die entschädigten eigenen Preiselastizitäten (*compensated ownprice elasticity*) deutlich verschieden sind von denen der gewöhnlichen eigenen Preiseselastizitäten hat angezeigt, dass es Nachfragenwirkungen in jeder Preisesänderung der Warengruppe gibt. Andere Warengruppen sind ansprechend (responsive) auf der Änderung des Reisespreises. Das Gegenteil ist nicht der Fall. In Allgemein ist kreuze Preisbeziehung unter den Speisengruppen weniger einflussreich ist. Die Einbeziehung der Haushaltsgröße in den ganzen AIDS Model fuer Nahrungsmittel wird gerechtfertigt von der Tatsache, dass die meisten Parameterschätzungen, die Haushaltgröße vertreten, statistisch bedeutsam (significant) waren. Deswegen, ist es fest gestelt, das die Ausgaben fuer die Mehrheit der Nahrungsmittel von der Anzahl von Haushaltsmitglieder beeinflusst werden. Ein zusätzliches Haushaltmitglied kann verursachen, dass einige Haushaltausgaben steigen fuer das eine oder mindern für das anderen, um auszugleichen. Als die Anzahl von Haushaltmitglied zunimmt dan verringern der Verbrauch des Tabaks, Früchte und Gemüse, vorbereitete Speisen, und Fisch und Fleisch. Diese Reduktionen sind gemacht,

um der Verbrauch von anderen Nahrungskategorien mit positiven elastizitäten, hauptsächlich Reis, Nicht-Reisstoffen, und essbares Öl. Die Zunahme der Haushaltsgröße ist mit der Abnahme derjenigen Speisenqualität verbunden. Der Verbrauch der billiger Kohlenhydrats-reicher Speise ist hauptsächlich eine Strategie, die von Haushalten mit große Mitgliedszahl genommen wird.

12. Die geschätzten Nachfragenparameter versorgen einen vollständigen und gleichmäßigen Rahmen für Bewertenschläge irgendeiner Regierungspolitik. Die Kombination des direkten Reises- und indirekte Tabak Preispolitikes ist in diesem Studie benutzt worden, die Nützlichkeit der Ergebnisse dieses Studie vorzuführen. Der Preis des Reises hat einen wichtigen Auswirkung auf das Ausgabenmuster von privatem Haushalt; weil Reis ein wichtigen Einflusses auf dem Haushaltausgaben hat. Die Preisberechnung, die in diesem Studie geleitet wird, schlägt vor, dass die Liberalisierung des Reismarktes eine Wohlfahrtsverbesserung an aller Einkommensgruppen macht. Wenn der Verbrauch von Tabak besteuert wird (indirekter Preisberechnung), wird dann Regierungseinkünfte steigen, ohne das Schaden von so viel armen Haushalten.

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CHAPTER I. INTRODUCTION

1.1 Structural Adjustment and Demand Analysis

Structural adjustment is a term used to signify an economic policy that requires a structural change in the economy of any country. The policy has been introduced by International Monetary Fund (IMF) and World Bank (WB) and usually applied as a measure aimed to gain recovery. Although the application might be different from country to country the policy is typically signified by the following principles: export-led growth; privatization and liberalization; and the efficiency of the free market.

Since the mid 1980s, Indonesia has conducted a structural economic adjustment programs in different intensity. In the pursuit of economic stabilization and promoting non-oil domestic sectors competitiveness, the adjustment has been undertaken to fight the debt crisis, balance of payment-deficits, and the growing fiscal burden. The measures taken were typical for structural adjustment programs: currency devaluation, trade deregulation, budget cuts, and reduced subsidies. However, due to domestic political reasons, the programs have not been completely implemented as well as expected, despite external pressures.

In July 1997, the financial crisis shocked the world. While Asia in general the most critical region to experience the crisis, Indonesia had the worst case among countries in this region. These indicators reflected the situation at the end of 1997: (i) a currency depreciation of 80 per cent, (ii) inflation rate of 50 per cent, (iii) a sharp increase of unemployment rate, (iv) loosening stock exchange value, (v) an increasing capital outflow, and (vi) economic contraction of around 15 per cent/per year compared to previous year[1].

This crisis has brought about dramatic changes, including the availability and accessibility of foods. Food security of the country has been seriously affected through job losses, the consequent decline in household incomes and access to food, and the rising price level of consumer goods which led to a sudden drop of the purchasing power of the people.

[1] Presentation by Dr. Syahril Sabirin, the Governor of Bank Indonesia at *Pbancque de France, (Paris Club) March, 1999.*

To respond the crisis, Indonesia invited IMF and World Bank for an economic recovering program. As a result, the government of Indonesia (GOI) faces a daunting list of obligation and challenges. Indonesia has committed itself on what is termed letter of intent (LOI), and this LOI called for a strictly monitored structural adjustment. Unlike the previous adjustment programs, the post-crisis structural adjustment program has been accompanied by an intensive pressure from international lending agencies, mainly the IMF and the World Bank demanding for liberalization of the domestic market and trade deregulation. The critical impact of these changes could be foreseen. Before the program, the agriculture and food policy of the country has been characterized by heavy input subsidies and low subsidized consumer prices for staple food. The policy used to be applied to protect low income consumers (World Bank, 1986, 1999) who in most cases be also producers at the same time (Timmer, Falcon, and Pearson, 1983).

It is believed that a substantial change in consumption pattern took place, but exactly how that change took place is still unclear. Indonesia's policy makers are therefore being challenged to design policies that are budgetary admissible, but enable the poor to be rescued from hunger and under-nourishment.

There is another important consequence resulting from the current Indonesia's crisis. Indonesia is now undergoing a profound political dynamic. Among other things, there is a stipulation of new laws enforcing an adoption of decentralization concepts on previously extreme centralistic administration system of the Indonesian government. Documented under State Law number 22 1999, this law stipulates that decentralization of power and responsibilities from the central authority to the local district authorities covers all aspects of government administrative sectors except for security and defense, foreign affairs, monetary and fiscal policy, justice and religious affairs. It is fairly justified to assume, that local specific characters of each region or local (district) authority will be more determining in shaping local economic policy. For the anticipation, policy makers have an urgent need on accessing local specific information, for the sharpening of regional specific economic policy making. This requires a deliberate and local specific study.

Since food budget is still dominating to the total household expenditure, information on food consumption pattern is of significance. This study was conducted as an attempt to

provide information needed in designing new food policy with possible instruments, to cope with new situation, with specification of East Java Province.

If the policy makers under allowing condition intervene to help those who are most severely impacted, the policy makers have to identify those who have been most harmed and the magnitude of the harm. In order to have a good scheme that brings forth the conduct of a wise fiscal policy especially during the period when the economy is being restructured, governments, including the government of Indonesia, need to know the approximate magnitude of the elasticities of some important goods. For that, one needs a knowledge that can be derived from a study of demand system. This study serves the information on how households respond to the environments they face. The important determinants are relative price and level of income. Policy makers on agricultural and Food sector have a considerable interest on the matrix of elasticities derived from food demand analysis. These are considered to be the decisive information for food supply planning and correspondingly, food production related issues. It may also assist in structuring and development of agricultural sectors policies as well. Knowledge on food consumption pattern which is normally a by result in demand analysis, may be viewed as an indicator of welfare barometers, and of course to design pricing policies of some strategic food commodities in country of crisis. This study has been done on the setting of this problematic economy.

1.2 Need for a New Study on Household Reaction

Unfortunately, the information on food consumption pattern in Indonesia is still rare and deficient. Until the 1990s, demand studies available for Indonesia, although extensive, do not include much information on cross price effects (Teklu and Johnson, 1987. They used single model, were therefore difficult to accommodate restricting assumptions in the preferential structure, and were inconsistent with demand theory, except with strict assumptions. The functional forms applied were less restrictive and theoretically consistent flexible (Teklu and Johnson, 1986).

To our knowledge, the study on demand pattern in East Java, especially that of after crisis period, has not been made. This study was motivated to fill this failing information. It was

undertaken to attain a reasonable support and theoretical plausibility for policy analysis. For that reason, a demand system approach was employed as a basis of the analysis.

The decisive impacts of economic changes and government policies (and programs) on consumption are determined by the responses of households. It is the household which functions as an intermediary between policies/programs and their impacts on individuals. The predicted reaction of households to any intervention should be a crucial factor in assessing the merits of various policy alternatives. On that ground, we used a micro data at household level in this study. With this idea in mind, we hope that this study may enrich our understanding of household demand behavior on food.

As noted above, though food demand studies in Indonesia are not new, there is an obvious lack of knowledge about interrelationships among commodities and food consumption behavior across regions. This knowledge on other hand is very important for policy makers because each region in Indonesia is composed of both different cultural groups and natural endowments. Therefore, the parameters estimated based on national data, are too restrictive to be applied to a specific community. Based on this reason, the present study will be focused specifically on food consumption behavior of urban and rural consumers in East Java, where a mixed of majority Javanese and a mix of other minorities reside.

The comprehensibility and importance for policy-makers of the elasticity concept have been well elaborated by for instance in Timmer *et al* (1986), Deaton (1989).

1.3 Cross-sectional Demand Analysis

There are many methods available for estimating the impact of large price change on consumer's behavior. One of them is the applied empirical method using an econometric method. As a micro econometric research, this work deals with empirical analysis of households, especially their behavior of household in allocating their disposable income on food items. The study emphasizes the use of empirical applications of microeconomics, with implications for efficiency and welfare analysis.

To capture the change, the estimation would have been done on the time series data of thousands of households collected from the periods before and after the crisis. This would be the ideal case, because such condition would allow us to examine the behavior change of the consumer when facing the large price change. Another aspect that belongs to the ideal

condition is also the availability of price data of food items composing the household's shopping basket. Such ideal conditions, unfortunately, have been not the case, in Indonesia. The possible available data is an aggregate data set coming from some resources. According to Leontief` (1993)[2] however, it is deficient if economic analysis be done on the basis of such models. Aggregative time series are mostly interdependent between successive observations. Furthermore, in the macro-analytical approach, complicated systems are usually formulated in terms of a small number of aggregative variables. Still, there are real possibilities that the analytical results fail to conceive rapid structural change due to aggregative measurement and the necessary attendant lengthening of the time series data used. The average consumption level of any country, for example hides a considerable variation among families within that country: as an expression of, among others; inequality in income. More importantly, in Indonesia there is no long enough reliable record of time-series data to allow the estimation of the price elasticities of certain goods to be executed. The likely consequence of this could be a poor empirical performance of such models. To overcome the drawback of modeling a large and complex aggregate economic system, one may use disaggregated models based on individual household data, revealing real food items consumed. The present study employed a household consumption/expenditure cross-section data set to meet this proposition. It is a methodological-and empirical exercise on the economics of household demand for a number of foods. The data used were micro-data of household consumption/expenditure of East Java province, from 1990, 1993, 1996 and 1999. Its novelty, for current Indonesian context at least, lies primarily in the use of large, detailed set of carefully compiled micro data from household consumption surveys. In response to the economic crisis, thus, these four survey rounds provide us with data body covering pre-and post crisis years. This may allow us to capture the changing pattern of household economic behaviors, especially their consumption behavior.

1.4 Food Demand Study and Policy Analysis

Basic changes in regulation of market can provide an opportunity for low-income consumers to improve their diets and real incomes; the information on variations in

[2] Leontief suggests, that there is a need for the methodological reorientation of economic analysis. (See American Journal of Agricultural Economics.75th Anniversary Issue. 75:2-5)

consumer preferences among income groups can be used to improve the cost-effectiveness of food aid programs, through use of "self-targeted" commodities. Knowledge of consumer's response to changes in economic parameters is of great relevance in policy making. Therefore a well-known application of household demand study on consumption commodities has been in the area of policy analysis. For policy makers information on consumer demand behavior on certain commodities is important to the whole steps of policy making process: to design, to implement or to evaluate a certain policy. Particularly for food policy making, the policy makers might want to know the impact of that policy on food consumption, food production, structural changes in food sectors, and the welfare of consumers and producers. The demand study will provide them with knowledge of consumption behavior of individuals or groups of individuals in their reaction on changing prices or other economic parameters affecting their consumption behaviors.

This study is also guided by such pattern of reasoning. For us, this food consumption analysis serves two specific functions. First, the analysis provides us with consumption parameters to understand adjustments in the changing macro food economy. Precisely, we might, empirically legitimated, conclude from the study, what happens to budget share of rice in any household when prices or incomes fall. Second, this analysis may help us to hypothesize at least, the likely nutritional impact of changes in the economic circumstances of the poor: What happens to the consumption bundle of the poor when their incomes change and prices fluctuate for the commodities they consume?

One of important province in Indonesia is East Java. A physical as well as statistical observation indicates that this province is a typical region with different spatial characteristics due to different endowment factors, pace of growth on development and at certain level, cultural backgrounds that might differentiate their purchasing behaviors. Because of this, using cross section data of several survey rounds might hopefully portray such phenomenon.

1.5 The Need of Evaluation of Alternative Price Policies on Different Income Groups

[3]The economic development of Indonesia during the 80's was distinctive significantly from that of previous *episodes* in the sense that in this period growth was brought about by what might be called *efficiency-led* or *supply side* paradigm. This growth was in part due to a deregulation of markets or otherwise market liberalization programs starting in 1983. An important factor to explain this development is that the deregulation program shifted the economic activity to non-subsidized sectors which further created its own momentum for the economy to grow: (1) the increasing productivity raised income and domestic demand, (2) expanding financial market mobilized savings and funded economic activities (3) expanding economy increased the confidence of foreign investors and buyers to have an idea that doing business in and with Indonesia is profitable.

The structural adjustment in Indonesia has been taken in response to internal and external imbalances. The structural adjustment „package" which was adopted and implemented covered four broad categories of measures relating to (Thoreback, 1992): exchange rate management, fiscal policy, monetary and financial policies, and trade and regulatory reforms. The trade and market liberating are also a manifestation of the country's position as a ratifying nation of Uruguay Round as well as AFTA (ASEAN Free Trade Area). The result of this adjustment is an economy, that more market-oriented is.

Market-oriented adjustments affect consumer's wellbeing differently. The welfare effects of the adjustment vary significantly for different income groups, since the behavioral parameters with respect to consumption are different across socio-economic classes. The expected consequences would be severe for the poor and be moderate or otherwise completely insignificant to the rich. Considering food security interest of the country's poor, the presence of another government policies is required. The policy should be in a position that can relieve the pressure on the government budget without risking the welfare of the poor. At this stage, the need for analyzing welfare effect on each actual income group of the country is essential.

[3] Parker, S. Survey of Recent Development in Indonesia. *Bulletin of Indonesian Economic Studies*, Vol. 27 No.1, April 1991

When using conventional welfare analysis of price policy changes, it is important to consider all consumers as a group[4]. That approach as a matter of fact, provides only a very general measure of the change in welfare because we cannot further infer the effects on specific groups of consumers. Since we are concerned with the effects of these adjustments on the well-being of specific target groups, it becomes neither effective nor useful when the focus is on all consumers as a group. The results could be misleading and erroneous. Hence, there is a need to make use of the specified demand equations possibly not only to measure accurate welfare effects caused by a given price policy on different income groups of consumers but also to manage in creating the possibility of designing compensation schemes for the poor.

Urgent agenda for the up-coming years includes the completion of reform and democratization within government institutions, the resolution of current and potential, fiscal and political decentralization, the establishment of civilian control over the military, reform of the justice sector, including bringing Soeharto-era criminals to justice, eradicating corruption, maintaining and advancing economic policy deregulation and improving the investment climate.

1.6 The Scope

No one can deny that Indonesia revealed a very impressive achievement with respect of food issues. For about 30 years, the main food staple in Indonesia has been treated as a public good in the sense that price formation was being done politically instead of by market mechanism. But in the last fifteen years pressures toward a relaxing politically based pricing has been so increasing that the central government of Republic of Indonesia is no longer in position to maintain their intervention in subsidizing foods.

Central budget pressure is up due to increasing deficit financed by foreign debt. And foreign financial institutions are increasingly pushing the GOI to relax the pricing regime in order for it to become more market oriented.

Indonesia committed itself in GATT and other international trade agreement. The spirit of these agreements is to have an open market. Consumerism, a group movement representing

[4]This is conducted using the concept of consumer surplus rendering an exact measure of consumer welfare only in restrictive cases.

consumer's interest is now in the advent of getting political power, partly due to the democratization of the politics in the country.

1.7 Objectives of the Study

Given the above description, the main objectives of this study is seek information containing consumption preference of East Java Households based on household's budget survey from 1990 to 1999. This is achieved through an estimation of demand parameters using system approach of demand analysis across different income groups. Having such demand parameters further objectives are

1. To analyze the effects of expenditure and price changes on demand of eleven food groups for different income groups in the province of East Java, Indonesia;
2. To evaluate the specific welfare effects of selected price policies for different income groups
3. To analyze a welfare change and at specific target group using welfare analysis consistent with this study.

1.8 Organization of the Study

This study is organized in eight chapters. Chapter 1 describes the problem setting and the significance and contribution of this study for the solution of the problem. This chapter is closed with a statement of objective and the organization of this study. Chapter 2 presents the general economic setting of Indonesia and a brief touch of East Java in particular, as an environment in which the data for this study has been drawn. Chapter 3 describes the data used in this study, including potential problems when using the data for study of this kind. Theoretical framework of the study is then presented in chapter four. The chapter begins with the underlying neo-classical consumer theory to adaptation needed to make the theory applicable in an empirical works. Discussion in this chapter also addresses the development of methods used to make this underlying theory applicable in empirical work, to the model choice and adaptation to be used in this empirical study. The last sections of this chapter present the working model to be estimated in this study. The methodological part of this study describes all attempts in the forms of statistical manipulation and techniques that have been applied in this study to bring the theoretical foundations be operational in

empirical work, or to make raw data we have meets plausibility needed for the estimation process. This part is introduced in chapter five. Chapter six displays the results of estimation and corresponding interpretation and discussions. Chapter seven demonstrates the use of empirical results in policy assessment followed by the corresponding analysis. By using the concept of compensation variation, it is demonstrated that this study provide a merit and advantage in policy analysis. In this chapter we used the results for the purpose of welfare analysis. The last chapter concludes the results and makes some suggestions based upon them.

CHAPTER II. REVIEW OF THE ECONOMIC SETTING

This chapter introduces in brief the economic development experienced by Indonesia as an independent state. Of the interests are the development strategy applied, the macro economic development and the role and performance of agriculture and food sectors *Vis a Vis* the rest of the economy. The aim is to give an idea of the economic setting in which the analysis of demand for food items is carried out. The information is required to provide a logical relevance for the analysis in chapters that follow. Even though it is brief, the chapter attempts not to forgo the clarity.

2.1 General Setting

The Republic of Indonesia is situated in Southeast Asia region. On August 17th 1945, it released itself from the Dutch colony by proclaiming independence as Republic of Indonesia. As an archipelagic country, Indonesia is a cluster, made up of estimated 17 000 islands. It consists of five main islands (Sumatra, Java, Kalimantan, Sulawesi, and Irian Jaya), two major archipelagos (Nusa Tenggara and Maluku Islands), sixty smaller archipelagos, and a myriad of small islands that spread around the Equator's line over about 5000 kilometers long. By the year 2002, Indonesia is a home of estimated 228 million people. With this number, Indonesia is thus the world's fourth most populated country[5].

From the location point of view, Indonesia has a strategic position in the region and may play itself as an anchor country in Southeast Asia in politics as well as in economy. As the fourth most populated country, Indonesia has a large number of labor forces with relatively low wages.

Naturally, Indonesia is a rich country with various natural resources, such as oil, minerals, rain forest timbers and biological diversity. In terms of size, its marine territory is bigger than its terrain. This abundance of natural resources is thus a huge potential for agriculture, deep rain forestry, fishery and mining. Even though it is rich in natural resources, Indonesia belongs to the poor group of countries in the world. In its early age, Indonesia faced food scarcity. And this phantom of hunger still haunts the country until nowadays.

[5] *Sources: Indonesian Central Bureau of Statistics (CBS), CIA's fact book.*

The economic performance of this country has been intensively determined by its political setting. Because of that, this study presents a result of survey on its economy. The information on the development of its social, economic, and political aspects will help the readers understanding on the issues being addressed in the next sessions.

2.2 The Economic System

According to the constitution, Indonesia is a socialistic state who gives a mandate to its government to undertake economic activities for the prosperity of the nation. The constitution states that "branches of production which affect the life of most people shall be controlled by the state", so, the government of Indonesia has an important role in the economy of the nation. It has not only the authority to regulate, but also the legitimate capacity to be a *player* in the economy. The government of Indonesia (GOI) is therefore a regulating agent, development agent, and economic agent at the same time. As an economic agent, the GOI may be an industrialist, who runs banking, utilities, industries, trading firms, domestic transportation etc. through its large number of state owned companies. By government controlling private sector in this sort, the economy was slowly turning from colonial capitalism to state capitalism. To be regulator, the government sets up and imposes measures on economic life. Given the very dominant role of GOI, there is a lack of clear guidance in implementing these principles in real economy. As a result, the role is interpreted differently by the ruling regimes of Indonesia's government. This principle together with double roles status of the president, as the head of state and the head of government, are believed to become source of economic mismanagement prevailing until this moment.

So in the time of the first President Soekarno (1945 – 1966), the principle of state dominance was interpreted as *Berdikari* (of self-reliance[6]) and later as principle of Guided Economy. Soekarno interpreted the economic mandate he had by undertaking ambitious building projects, nationalizing foreign enterprises, and refusing to undertake austerity measures recommended by foreign donors, because such measures would have weakened his support among the masses.

[6] in reality it was an expression of distance from the west while inclining to east block.

In the time of Soeharto, — the second president — the economy was also used for political ends. But Soeharto has run a generally orderly process of development, supported by large inflows of foreign aid and investment. In a break from the socialistic Soekarno's Guided Economy, Suharto's *New Order* regime welcomes the seemingly private market development. Closeness to the west, politically as well as economically, was a paramount distinction of Soeharto era. So, Soeharto interpretation on the role of government in economic live was probably the single greatest discontinuity from Soekarno.

2.3 The First Two Decades

Following economic pattern of the colonial era, Indonesia was in principle an agriculture exporting country in the 1950s. For the complete dismantling of colonial economy and under the spirit of state capitalism, the state owned companies took over all plantations and colonial or private enterprises in 1957. There were about 300 Dutch plantations and 300 firms in various areas such as mining, trade, finance, and utilities, which were finally under the control of the Indonesian government. Inexperienced military officers and unskilled civil servants replaced the management in these companies.

Under the Guided Economy, Soekarno seeks to industrialize the country through the path of "socialism a la Indonesia". In this regime, development planning and control is centralized. The nation's first five-year development plan (1956-60) proposed government investment in public infrastructure, but offered little regulation or overall guidance to the private sector. This plan was shadowed by dramatic developments in the political and economic aspects.

By the mid-1960s, half of credit endorsement of the central bank was for the government expenditures. This deficit spending led in turn to mounting inflation, which peaked at 1,500 percent between June 1965 and June 1966. At the same time, foreign debt increased, both from the West and increasingly from the Soviet Union. In spite of a highly visible public building campaign, the economy stagnated and by 1966 per capita production was below the 1958 level.

To sum up, Indonesia's economy in this period suffered from neglect and economic mismanagement. As a result, the inflation was rampant, the export revenues decreased dramatically, government expenditure was high leading to budget and current account

deficits. Scarcity in basic necessities forced people to depend only on ration. The economic bankruptcy brought Indonesia into a period of severe political turmoil in the 1960s. In 1967, this political turbulence brought the old government under president Soekarno to an end; it gave an opportunity to a new government with new economic regime to come to power. Under the new regime, thanks to its economic reorientation, economy has transformed from virtually stagnant entity into pre- industrializing economy.

2.4 1966 – 1980: Period of Recovery

In 1966, following the downfall of Soekarno, a new regime came into power under President Soeharto. The *New Order* regime pursued, with financial assistance from the International Monetary Fund, a variety of emergency stabilization measures to recover the economy. The development plan was made on basis of five-years planning cycles or REPELITA. The first REPELITA started from 1969. The REPELITA is a medium run development guidance which is introduced centrally and is applied nation-wide. There is a national planning Agency (BAPPENAS) headed by a minister-equivalent officer. The task is to design a development plan that rules nationally. Indonesia under Soeharto has completed sixth REPELITA until 1998.

The main feature of economic development strategy under Soeharto is the principle of balanced budget. Under this regime, the current account of the country is kept balanced. The development pursuit was a pragmatic growth, with fiscal and monetary conservatism as a hallmark of the economic regime. Growth in the money supply was restricted to contain inflation. Similarly important is the role of government as an industrialist by state direct investment, increasing regulations and offering special protection for favored industries.

This period was marked by an increasing oil price and thus booming oil revenue for Indonesia. At the same time, Indonesia experienced a massive capital inflow foreign aid. As a consequence, the Indonesian economy has experienced a major expansion in the first three REPELITAs, marked by GDP growth at 7.2 per cent yearly and rice self-sufficiency by mid-1980s (Thorbecke, 1992).

2.5 1980 – 1996: Stabilization and Growth

Oil crisis has forced Indonesia made two important changes: stabilization programs and promotion of non-oil industries as an alternative fuel of growth. The stabilization program was aimed at solving the balance of payment deficit and the growing fiscal burden. Other government response took the forms of devaluation of *rupiah* (Indonesian currency), deregulating measures to promote non-oil exports, budget cuts and reduced subsidies. Several capital and import intensive projects were postponed and subsidies on fuel, agriculture and states enterprises were reduced (Nasution, 1991).

Under this program non-oil resources have been worked out, work force has been trained in basic skills, and the strategic geographical location has been promoted seriously. As a result, Indonesia maintained most of the advantages that fuelled rapid economic growth during the 1980s and early 1990s and a large and expanding internal market of approximately 210 million people have been developed, until the crisis broke out in 1997. Despite of the crisis at the end of the 90s, these factors will remain attractive for other countries, especially if the government of Indonesia makes significant advancement on their policy challenges.

2.6 The Debt

As the role of debt in shaping the policy choice of Indonesia's government is so obvious, it is important to review the debt of Indonesia. As reviewed previously, Indonesia adopted what is called a floating balance of account: The deficit is funded by foreign debt from many overseas lending agencies. In practice, the government of Indonesia borrowed abroad each year, primarily from the World Bank, Asian Development Bank, and a group of bilateral donors grouped in the Consultative Group on Indonesia (CGI). The proceeds were used to fund the development budget. By long-established convention, the GOI of the new order regime – contrast to the predecessor-- avoided domestic borrowing, and Indonesia's debt - GDP was sustainable. Indonesian debt management policies were an important part of what was widely viewed as a prudent macroeconomic management strategy.

Prior to the 1997-98 financial crises, Indonesia's debt was considered not too critical. This situation changed in 1998-99, when Indonesia for the first time developed a large domestic debt stemming from the costs of the country's banking sector bailout. At that time,

Indonesia's official debt burden increased from 27 percent of GDP prior to the financial crisis to approximately 100 percent of GDP at the end of 2000. Although Indonesia has shouldered high debt - GDP ratios in the past (most recently in the late 1980s), the costs of servicing the country's official debt placed a heavy burden on the budget. In 2001, interest payments on Indonesia's domestic and foreign debt were forecast to reach almost 35 percent of central government expenditures. By way of comparison, development spending accounted for only 17.5 percent of domestic government expenditures, and more than half of this sum stemmed from donor-financed development projects.

Table 2.1 GOI Foreign and Domestic Debt, 1995-2000 (USD Billions)

YEAR	DEBT/GDP		TOTAL	RATIO
	Foreign	Domestic		
1995	63.5	0.0	63.5	31%
1996	56.3	0.0	56.3	25%
1997	57.9	0.0	57.9	27%
1998	67.3	0.0	71.5	72%
1999[1)]	75.8	68.7	144.5	102%
2000[2)]	74.8	78.0	152.8	100%

***Source**: Bank of Indonesia.*

[1)] Domestic debt figure based on Rp. 312 trillion in bank recapitalization bonds issued, plus Rp. 228 trillion in bonds issued to repay Bank Indonesia for liquidity credits, converted at the 1999 average exchange rate of Rp. 7855/USD.

[2)] Domestic debt figure based on Rp. 430 trillion in bank recapitalization bonds plus RP 228 trillion in bonds issued to BI, converted at the 2000 average exchange rate of RP 8430/USD. Foreign debt figure is presented through October 2000.

In order to reduce the short-term burden to the budget, Indonesia has concluded debt-rescheduling agreements with the Paris Club group of official bilateral creditors on two occasions. In September 1998, the GOI and Paris Club agreed to reschedule USD 4.6 billion in principal payments falling due from August 1998 to March 2000. In April, they concluded a similar agreement rescheduling USD 5.8 billion in principal payments falling due from April 2000 to March 2002. However, Indonesia cannot take advantage of the latter reduction until it reaches agreement with the IMF on a new letter of intent.

Table 2.2 Indonesia: Net Capital Inflows (USD Billions)

	1993	1994	1995	1996	1997	1998	1999	2000[2)]
Private	5.2	3.7	10.3	11.5	-0.4	-13.8	-9.9	-8.5
FDI [(1)]	2.0	2.1	4.3	6.2	4.7	-0.4	-2.7	-4.1
Other	3.2	1.6	5.9	5.3	-5.0	-13.5	-7.2	-4.4
Official	12.8	0.3	0.3	-0.5	2.9	10.0	5.4	3.8
Total	18.0	4.0	10.6	11.0	2.5	-3.9	-4.5	-4.7

Source: *Bank of Indonesia; (1) Foreign direct investment; (2) Preliminary data.*

2.7 Economic Structure

Thanks to richness in natural resources, Indonesian economy has been for almost three decades extractive in manner, in the sense that resource extracting sectors like mining, forest, cash crops agriculture dominated the contribution in the country‘s general domestic product (GDP).

Before the mid-1970s exports consisted mainly of a small number of primary commodities, including natural rubber, coconut oil and copra, tin, and crude oil. By the end of the 1970’s oil sector has been the main foreign currency earner. Because of deregulation, the country has become less dependent upon exports of oil and gas since 1980, and efforts to increase other exports have been encouraged.

It is only from the mid 1980s on, that Indonesia has a reasonably well-balanced economy in which all major sectors, including manufacturing industry and services play an important role. Agriculture (including animal husbandry, fishing and forestry) has historically been the dominant sector, in terms of both employment and output. There is a vast range of mineral resources, the extraction and exploitation of which have proceeded rapidly in the past three decades, enabling the mining sector to make an important contribution to the balance of payments. The manufacturing sector also expanded dramatically during the New Order period, especially since the mid-1980s. The decline in petroleum prices after 1983 resulted in a concerted push towards industrialization, as a result of which semi-processed and manufactured products increasingly came to dominate exports. A determined effort to promote tourism since the mid-1980s has also had a big impact on invisible export earnings during the past decade. In 1991, the share of manufacturing in GDP exceeded that of agriculture for the first time. More recently, the services sectors have expanded rapidly, and

in 2000 jointly accounted for approximately 40% of GDP and employed about one-third of the working population. Exports provide the main impetus for growth. Low levels of domestic disposable income mean that exports have been the primary engine of growth.

Because of enduring degradation of natural resources, it is expected that the contribution of primary products becomes less and less. Forests, for example, are declining by as much as 1 million hectares per annum, and Indonesia is expected to become an oil importer early in the next century. As for primary commodities, its relative share in total GDP was 60 percent in 1970. It was 39 percent at time of growth, and became only 8.6 per cent in 1998[7]. The sharp contrast is performed by valued added of this sector, meaning that manufacturing of agricultural produces experienced an increasing tendency.

The natural resource base of the country is increasingly degraded, leaving less for the regime to exploit, and less for the growing rural population to seek its livelihood from. Indonesia economic development performance in the 1990s, which is the period of the survey for this study, is briefly displayed in the following table.

Table 2.3 Selected Macro Indicators of Indonesian Economy

	1990	**1993**	**1996**	**1998**	**1999**
GDP ($ Billions)*	114.4	158	227	96.8	141,3
Real GDP Growth (%)	7.2	6.5	7.82	-13.2	0.3
Per capita GDP (US $)	623	630	1146	1070	448
GDP by Sectors					
Agriculture	20.6	18.79•	16.3	18.4	27.8
Manufacturing	37	39.42•	41.6	23.4	36.2
Services	29	41.79•	80.5	35.7	56.9
Government	n.a**	nab	10.5	4.1	7.2
Labor Force (Millions)	75.9	n.a	94	92.6	94.8
In Agriculture	55.9	n.a	n.a	n.a	43.2
Currency Rate (Rp/1 US$)	1842.8	2087.1	2342.3	14.850	7855.200

*Sources: Central Bureau of Statistics, CIA Fact book, * CIDES, Bank Indonesia, Ministry of Finance, U.S. Commerce Dept. +June 1998* • the IPCC Data Distribution Centre.
n.a = not available

Government development emphasis in early 1990s was typically characterized as less interference in private business and greater support on technology inputs. The agriculture sector predominated and benefited from the infusion of modern technology by the government. Indonesia was at that time a major recipient of development aid from

[7]*Source: Bank of Indonesia, Source: U.S. Department of Commerce, Bureau of Economic Analysis*.

international donors. Major trade partners were Japan and United States, and the trade with ASEAN fellow members was increasing.

2.8 Food and Agricultural Policy

Compared to other sectors in the economy, the contribution of Indonesian agriculture sector to the gross domestic product has been steadily declining. However, its role remains important to the economic development of the country.

Agriculture sector includes forestry and fisheries. It is the most important sector of the economy in terms of employment. As shown by the 1990 census, its share in total employment was 55 percent. That percentage practically remained unchanged from the previous census in 1980. The current indicator shows that the sector provided approximately 41 percent of employment for the country's labor forces.

In term of output, the share of this sector to the GDP declines steadily. While the contribution to the GDP in the 1970s assumed approximately some 33 percent, its share by the early 1980s was around 23 percent, and further declined to 16.3 percent in 1996.

However, its important role in the provision of food and employment for the population of the country is still evident.

Indonesia has been internationally recognized in its achievement in agricultural development due to increasing rice production which has led to rice self-sufficiency for the country in 1984 (Dillon, 1992). The achievement of agriculture sector in term of domestic production and the improvement of food security was still remarkable until 1996.

Governmental programs, introducing modern agricultural techniques, infrastructure in the rural areas, heavy subsidies for both input and output of food producing sector, have been identified as factors contributing to that achievement.

Self-sufficiency on food or rice particularly, has been a main concern of food policy in Indonesia, likely for social-political reasons. Because rice occupies about two thirds of the total harvested area under food crops, its performance dominates overall agricultural growth. The interest on self-sufficiency on food for a country like Indonesia is clear, when one takes into account of the potential risks that might come out of its dependence on world market supply. The risks could be in the form of e.g. trade embargo, or food supply insufficiency in the international market, say because of intended or unintended stopping in

some major producing countries. However, the extreme dominance of rice in both production and consumption is such that the achievement of self-sufficiency until this moment poses important policy issues which have ramification for the entire Indonesian economy.

Therefore, following the achievement of rice self-sufficiency, agricultural policy makers turned their attention from a rice-based to a multi crop-based food policy. The reason for that is quite obvious. As described before, due to declining oil revenues and oil price prospects, changes in agricultural production technology, current level of government debt, environmental concern, Indonesian is considering reducing its subsidy on agricultural chemicals, pricing water to recover more of its cost and buffering the domestic rice price less relative to world market (Teklu and Johnson, 1988). Furthermore, the changing pattern of rural and urban consumption associated with the development of the country has imposed a new demand on a policy change.

The adherence into open market mechanism is now becoming imperative as Indonesia, due to the dramatic crisis, is now committed to implement *letter of Intent* with the IMF, World Bank and other international lending agencies.

The changes in consumption pattern associated with these policies must be correctly anticipated if the agricultural sector is to be properly positioned in the upcoming development plan. Food policy that is based on accurate information on food consumption pattern may contribute a just solution in production, distribution and price of agricultural products. These changes are therefore of interest to agriculture policy makers.

As far as agriculture policy concerned, there have been four applied measures dealing with crops sector in Indonesia. The measures covered the following areas:

I. Product and area targets extending to the first crop and in irrigated areas also to second crops. This policy was conducted simultaneously under the title of BIMAS or mass guidance program, which led Indonesia into the achievement of self-sufficiency in rice production in 1984. This policy was relaxed in the early 1990s.
II. Price policy consisting of floor price for selected crops, i.e. rice, maize, and soybean, at appropriate levels through.
III. Agriculture subsidy covering both the agriculture producer as well as consumer subsidies. The producer subsidy program was called *Ponca Usaha*, literally means five

items subsidy package; it consists of seed, fertilizers, chemical pesticides, credit, and consultation service. In addition to that, irrigation tax was not charged to the agriculture producers. The consumer subsidy was executed through a purchasing scheme and special market operation for selected target groups.

IV. Price support for agriculture producers. This policy was imposed by using of several instruments, such as high level price for some domestic produces, import control mechanism, and domestic marketing boards for selected crops. The marketing board was in the reality a quasi-state monopoly, in which producer participation to the marketing scheme was obligatory. Examples for the schemes were marketing boards for clove and citrus, where the growers of these two commodities were forced to participate in the schemes. In addition to these schemes, there was also an obligatory registered channeling of fresh produce through central urban markets, and gradual relaxation of this rule in the late 1980s;

The above listing policies and recent changes indicates the very broad spectrum of interventions by the state in the production, collection and marketing of annual food crops and industrial crops.

All these policy events indicates a strong move towards centralization in the 1970s and the early 1980s, and after the reform of the banking system in 1986, an increasing emphasis on local initiatives, and since the early 1990s a reliance on entrepreneurships and abandonment of central guidance in food crop agriculture. A market-led diversification became a leading direction in agricultural sector (Affif, 1992) and Timmer (1989:7). A liberalization of the agricultural and food sectors is now becoming an obligation for Indonesia, as this country has no longer other choice to take.

To sum up, as a typical phenomenon of developing country, Indonesia started for their agriculture development from food price policy environment that used food imports and budget based subsidies for across-the-board consumer protection, while a host of production-oriented government projects attempts to increase food output.

To the current regime such price policy orientation is deemed backwards. A contending mainstream of food policy maintains that the government of Indonesia can more effectively meet the full range of food policy objectives by using price policy, not to keep food prices low for consumers, but as part of the incentive package that induces greater food

production from millions of small farmers. Programs and projects can provide targeted food subsidies to protect the very poor until they find jobs and higher incomes that result from the new policy environment. Reversing the prevailing policy toward dealing with hunger does not mean a new emphasis on production while food consumption problems are ignored, because such a strategy would fail on both political and humanitarian grounds. The reversal of policy and project roles does mean dealing with both production and consumption issues in a manner that creates fewer-not more-problems of poverty and hunger for the future.

This argument, while gaining full supports from ranges of influencing groups (including of course the IMF and World Bank, - two determining giants in current Indonesian economic policy setting), is however politically not yet amenable.

2.9 Consumption Pattern

A brief look on the consumption situation in Indonesia over the survey periods (1990 – 1999) may be followed in Table 2.4.

Table 2.4 Percentage of Average Monthly per Capita Expenditure on Food and Non-food, Indonesia

NO		1990	1993	1996	1999
1	Food	60.36	56.86	55.34	62.94
2	Non Food	39.64	43.14	44.66	37.06
	Total	100.00	100.00	100.00	100.00

Source: Central Bureau of Statistics, Indonesia, 1990 -1999

In the 1990s, the economic development of the country has brought about some changes: an increasing disposable income, changing price ratios and level, altering population structure, changing tastes and habits, and the incoming of new products by multinational food companies. This situation allows a new food variety to be offered to the Indonesian households. Food categories itself have changed, among other thing, due to increasing food manufacturing and retailing industries. These factors may affect the consumption habit and consequently consumption pattern of the people. Some indicators confirmed these changes:

1. An obvious change of per capita income: In the mid-sixties, the Indonesian per capita income was $ US 70. In 1996, before the crises broke out, the per capita income was $ US 1100 (*Bank of Indonesia, 1996*).

2. Changing rate of population growth: The growth rate was 2.0 % per annum in 1990. After a slight decrease in 1996, it raised to 2.3 annum again in 1999. However, this growth has been accompanied by better other demographic indicators, such as the increase of life expectancy and the decrease of infant mortality, etc.[8]
3. The changing of retail structure entailing urbanization; the change has induced the retail price structure as well. This has caused changing relative prices, i.e. money price of any good after being deflated by consumer price index.
4. On the other hand, the intensive effort of the government of Indonesia to achieve rice self-sufficiency seemed to bring a crucial impact on consumption pattern of Indonesian food consumer.

These factors are believed to be the main determinants in shaping of consumption pattern in Indonesia. Along with Table 2.4, Table 2.5 to 2.7 displays some other indicators for consumption pattern in Indonesia.

Tables 2.4 reveals that, in the period of economic growth (1990–1996)[9] the food consumption in Indonesia followed the pattern of Engel's Law: the percentage of food budget decreases as the purchasing power of consumer increases. The figure of the year 1999 indicates that the economic crisis in Indonesia has set the level of people's wellbeing back into the period before the crisis, roughly formulated. The loss of purchasing power has forced people to meet their basic need first.

Table 2.5 Monthly Average Budget Share of Food by Commodity Groups in Indonesia, 1990 – 1999

Food Groups	**1990**	**1993**	**1996**
1 Cereals	29.89	24.30	23.12
Tubers	1.66	1.49	1.22
Fish, Meat, Eggs and Milk	18.78	19.47	19.84
Vegetables, Legumes, Fruits	18.42	17.47	17.69
Other Items	14.88	14.87	14.61
Prepared Foods& Drinks	8.40	13.51	15.35
Alcoholic beverages	0.20	0.19	0.14
Tobacco & betel	7.77	8.70	8.03
Total Food Share	100.00	100.00	100.00

Source: ***SUSENAS –1990 – 1996***

[8] Source: Statistics Division, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

[9] In this period, average economic growth was 6.5 percent.

The consumption structure of average Household in Indonesia is presented in Table 2.5, while Table 2.6, decomposes the consumption pattern across the areas: rural and urban.

Table 2.6 Monthly Average Share of Food Expenditure by Commodity Groups in Rural and Urban Indonesia 1990 – 1996

COMMODITY GROUP	1990		1993		1996	
	Rural	Urban	Rural	Urban	Rural	Urban
1. Cereals	22.87	11.9	18.41	9	17.4	8.47
2. Tubers	1.38	0.52	1.2	0.47	0.95	0.42
3. Fish	6.39	4.73	5.96	4.41	5.58	4.03
4. Meat	2.54	3.4	2.43	3.54	2.54	3.7
5. Eggs and Milk	2.25	3.38	2.41	3.42	2.69	3.2
6. Vegetables	6.16	4.32	5.84	4.05	5.89	4.08
7. Legumes	2.61	2.25	2.42	2.04	2.22	1.67
8. Fruits	3.4	3.22	2.71	2.76	2.78	2.98
9. Oil and Fat	3.26	2.08	3.1	1.95	2.99	1.85
10.Beverages Stuff	4.1	2.76	3.82	2.52	3.71	2.31
11. Spices	2.38	1.61	2.25	1.47	1.68	1.15
12. Alcoholic beverages	0.14	0.09	0.13	0.08	0.09	0.07
13. Tobacco and betel	5.33	3.88	5.78	4.08	3.88	3.43
14.Miscellaneous	0.78	0.66	0.96	0.75	1.42	1.14
Food Budget Share	63.59	44.8	57.42	40.54	53.82	38.5

Source: ***CBS, Indonesia, 1990 - 1996***

Table 2.7 shows another indicator of consumption situation in the study area East Java. The table presents an average structure of consumption in term of calorie and protein intake. Food groups presented in the table are constructed from around 250 food items listed in the survey of SUSENAS[10]. The prepared food group covers all food items that are produced mostly by food manufacturing industry, not prepared by the households themselves, in the form of either purchased or given as a gift, or both, to the households.

Though the four tables express consumption pattern differently, there is a generality that can be caught up from them, especially with regard to the consumption in the study areas. The consumption pattern follows more or less the same tendency.

[10] See chapter 3 for further information about SUSENAS

Table 2.7 Average Daily per Capita Consumption of Calorie and Protein by Commodity Group, 1990, 1993, 1996

NR.	COMMODITY GROUP	CALORY (Calorie)			PROTEIN (gram)		
		1990	1993	1996	1990	1993	1996
1	Cereals	1247.20	1 210.42	1 152.86	24.08	23.26	17.03
2	Tubers	106.57	93.70	58.12	0.88	0.81	0.44
3	Fish	38.33	40.14	42.62	7.01	7.26	7.16
4	Meat	20.02	20.91	38.74	1.31	1.40	2.52
5	Eggs and Milk	21.53	27.79	34.82	1.33	1.67	2.07
6	Vegetables	40.33	37.75	36.25	2.85	2.63	2.45
7	Legumes	49.17	51.07	60.48	4.65	4.97	5.08
8	Fruits	42.88	37.83	40.43	0.51	0.43	0.41
9	Oil and fat	201.33	212.49	221.53	0.75	0.71	0.55
10	Beverage Stuff	90.19	94.17	113.64	0.72	0.79	0.95
11	Spices	26.41	27.54	15.55	0.81	0.84	0.67
12	Miscellaneous	12.09	15.71	34.17	0.43	0.53	0.62
	Total (without no.13 &14)	1 896.05	1869.52	1849.21	45.33	45.30	49.93
13	Prepared Food	87.03	149.31	170.46	2.06	3.59	4.56
14	Alcoholic beverages	0.15	0.14	0.12	-	-	-

Source : Central bureau of Statistic, Indonesia, 1996

Following patterns of consumption are learned from the previous tables:

1. Over time of observation, food still embodies a main component of monthly expenditure of average Indonesian. This holds for Indonesia nationwide.
2. Staple foods (cereals and tubers) account for majority of the expenditure. Among the staples, rice is the prime item. Rice is the main staple crop in all parts of the country. This has been the case, partly because of government food policy that put rice as a single leading indicator to define self-sufficiency for the whole country. The government defines self-sufficiency as the condition in which national production of rice has reached a pre determined quantity. The quantity is determined simply by multiplicationon per capita basic need of rice with the number of Indonesian population, including those who are traditionally use other stuff as a staple. With this approach applied in the copuntry rice becomes more and more available all over the

country, and people who are previously not rice eater learned to eat rice, simply because rice is more accessible for them. Rice is therefore consumed by more than 95 % of the population; although in some parts of Indonesia people have previously their own local staple food. As secondary staple foods follow maize, cassava, sweet potatoes, peanuts and soybeans.

3. The prepared foods in aggregate gain more and more preference from the Indonesian households. Its pattern follows an upward trend. Urbanization is deemed as the factor responsible for this tendency. The tendency may represent the consumption of people in some central-industry areas, which has been reducing their consumption on rice and substituting it with wheat based processed food. However this phenomena is still of minor significance, compared to the whole country tendency.
4. Share of (supposedly to be) luxurious food groups (meat, fish) to the total food budget of the east Java households are still low.
5. The food share to the total expenditure is bigger in a rural area than in an urban one. This holds for almost food groups. This mught happen, because the absolute value of the expenditure in monetary term is low. Stated in monetary term, the average per capita monthly expenditure for food in 1990 was Rp. 22 633, - (*Rupiah*[11]) for urban area, and 16 379 *Rupiah* for rural area. In 1996, the value was Rp. 48 278, - in the urban, and was Rp. 33 345, - in the rural.

2.10 Food Security and Distribution

Food security has been an ocupying issue in a the Indonesian history, and the economic crisis in 1997 has made the issue become more critical in the country. Not only the declining of purchasing power and induced price rise (Table 2.8), that threats directly the food accessibility, but also the climatic condition, like the phenomena of *El Nino* bring a growing concern on food security.

[11] Indonesian currency

Table 2.8 Price Increases of the Nine Essential Commodities July 1997-April 1998

Food goods	Java	Off Java
Rice	50%	37%
Salted Fish	56%	42%
Palm Oil	134%	80%
Granulated Sugar	36%	31%
Salt	66%	32%
Kerosene	8%	6%
Washing Soap	77%	72%
Textiles	38%	39%
Batiks	25%	30%
General	51%	39%

Source: *Central Bureau of Statistics. 1999*

With the approval of the IMF, the government began subsidizing imports of rice and other essential commodities in early 1998**. Bulog**[12], whose role was supposed to be cut sharply as part of the liberalization of the real economy, instead expanded its role as food wholesaler for rice, soybeans, wheat, sugar and other commodities. The government provided exchange rate and consumer subsidies for basic commodities, incurring significant costs as the exchange rate continued to deteriorate. Apart from their burden on the budget, subsidies introduced other complications.

Food security

Indonesia is presently facing serious problems with regard to food security: The droughts that came in the time of crisis have worsened the situation. *El-Nino* phenomenon as well as forest fires have affected the food production. To fill the gap between the low domestic production and the consumer demand, the government had to increase food imports. In the mean time, Indonesia was receiving food aid from Japan, Australia and the UN due to the crisis. Indonesia is therefore classified as a "Low-Income Food-Deficit Country" (LIFDC) by the FAO. The government has made efforts to target the subsidies at lower income groups rather than across-the-board.

[12] a statal agency established in time of Soeharto; It engaged in food procurement with monopoly power. It losed monopoly power after economic liberalisation.

CHAPTER III. THE DATA SET: SUSENAS DATA

This study employed the Household Consumption/Expenditure data: a data set provided by a so called National Socio Economic Survey (widely known as SUSENAS) in Indonesia. The set thus consists of grouped, namely a household, rather than individual micro level data.

This chapter provides explanation on the characteristics of the survey and the data it produced, so that the feasibility the strengths and weaknesses of it in relation to its applicability for empirical study of demand can be discerned. A deliberate discussion will address the nature of data, the related concepts and definitions used in the SUSENAS. In addition, some aspects or problems encountered when using SUSENAS data for analyzing consumer behavior is also addressed.

3.1 SUSENAS Data

The National Social Economic Survey (SUSENAS) is a household survey carried out annually by the Indonesia Central Bureau of Statistics (CBS). The aim is to collect socio – economic data of households. The following main variables are collected in the survey: the characteristics of the people's education, health/nutrition, housing/environment, criminality, socio-cultural activity, and domestic travel, community opinion about welfare, and consumption and income. These variables are classified into two categories: *core* and *module*. The core variables appear on a yearly basis, while variables in the *module* are collected and appear only once in every three years. The data sets used in this study belong to consumption/expenditure module.

Actually, the survey has been started since 1963 and the micro-data produced has also been there ever since. So the CBS has among their data holdings the micro-data set from 1963 to 1999. However, due to heterogeneity in sample units, sample size, region coverage, and information contents in some points of survey -years, not all of data set can be merged and an analysis over time using all rounds available is not viable.

The data sets used in this study are the micro-data of household consumptionn/expenditure of East Java province, from the SUSENAS rounds of 1990, 1993, 996 and 1999. With

respect to economic crisis, thus these four survey rounds provide us with a data body covering the pre-and post-crisis situations. Each round of survey is broken into rural and urban households and the estimation of demand parameters was done accordingly. The selection of four survey coverage is based on the ground that there is an important change happened between these time span. The change has been so profound, that especially policy makers need to know, how that economic event impacted the consumption pattern of the consumers.

A major advantage of the study is that the study included also the most recent data available in Indonesia, as long as the SUSENAS Household expenditure concerned. So it should reflect the behavioral response of the consumer of the economy under crisis, in addition to data for previous periods. Thus the data used in this study covered also adjustment made by households under investigation as a reaction of economic crisis. Thus both economic environments, -the pre and the post crisis, are accordingly captured in the survey.

As mentioned previously, household consumption/expenditure data set is one of three modules contained in the SUSENAS. The original purpose of the Central Bureau of Statistics (CBS) of Indonesia to run the survey is to collect socio-economic information for establishing an aggregate data. Three modules mentioned previously are (1) consumption and income module, (2) health, education, and housing environment module, and (3) socio-culture, criminality, and domestic travel module. Each module is collected from a sample of households every year but at different points of time. To protect confidentiality of the respondents, the household identity is kept anonymous. However, for research purpose of this study, the data set containing information on individual households was accessible after anonymization.

The Consumption and income module of the SUSENAS survey covers all household expenditure during a week of enumeration with full specification of commodities. Listed in the questionnaires are 231 consumption items, for which data on quantities and values were gathered. For non-food consumption only value data were generally asked except a few for which quantity questions were included. The questionnaires include also a section on income, even though income is generally regarded as delicate subject and omitted in many budget studies. Questions on household income were formulated so that all income sources

were covered. Information on salaries and wages was requested from employee respondents while profits were reported by entrepreneurs.

Table 3.1 Numbers of Households Co-operating in SUSENAS in East Java, Indonesia from 1990 – 1996

YEAR		NUMBER OF HOUSEHOLDS
1990	Urban	856
	Rural	4836
1993	Urban	2762
	Rural	4876
1996	Urban	2832
	Rural	5183
1999	Urban	3250
	Rural	5302

Sources: SUSENAS, 1990 – 1999

Transactions relating interest, rent, gifts, grants, money pooling, loans and commercial papers were all specified.

The SUSENAS sample was selected as to represent 27 provinces of[13] Indonesia - all parts of the country. With 65 000 households in the sample, representing both rural and urban areas, nation-wide, the survey was capable of obtaining both national and regional level estimates. Exactly the same forms of questionnaires, field instructions and coding notes are used for the data collection in all provinces.

3.2. Data Collection Methods

Data collection was undertaken through direct interview to the selected households. For information related to household characteristics such as information on housing, consumption and expenditure, the respondent is the head (the wife or husband) of household. For information related to individual characteristics such as information about health, education, activities, and demographic characteristics, the questions should be asked to each household member, except the information of children where the respondent must be their parents.

For enumerators, i.e., the people who did the interviews, BPS usually used its permanent staffs, called *mantri statistik* (Mantis). There is one Mantis for each sub district (called *Kecamatan*). From the 1993 Susenas, where the sample size increased significantly, the

[13] The study employed data of one province, East Java representing data of 8 832 urban and rural Households.

BPS office branches in all provinces and districtt (regencies) had to hire additional non-permanent workers (called *Mitra Statistik*) as interviewers.

Before taking to the field, the enumerators were rigorously trained in a nationally organized training on the implementation of the survey. The training topics were technical aspects of the survey such as the definitions of variables used, the procedure of filling out the questionnaires, interview technique, etc.

3.3 Sampling Methods

The CBS applied *the three-stage stratified sampling* for the SUSENAS with the following procedures: At the first stage, the CBS chooses survey enumeration areas systematically. This is done by use of a list of enumeration areas for the Population Census as the *sampling frame*. At the second stage, the CBS selects one segment randomly from the enumeration area. In the last stage, the CBS selects 15 households from the segment systematically, to represent each selected segment. Every household selected in the survey was visited by an enumerator who was given the responsibility of interviewing directly the respondents to excerpt the required data items. For information related to household characteristics such as information on housing, consumption and expenditure, the respondent is the head or the spouse of the head of household. For information related to individual characteristics such as information about health, education, activities, and demographic characteristics, the question should be asked to each household member, except the information of children where the respondent must be the parents.

For food consumption the survey reference period was one week prior to the enumeration of data. For non-food consumption the reference period was either one month or one year. In this case, the first concern of the survey design is that each individual household answer shall accurately report the actual expenditures of the household concerned.

This survey calls for highly detailed information on food expenditure which can only be obtained reasonably accurately by having the participants keep diary or record of all purchased. However, the interview method used in the SUSENAS does not rely on household's diary or record keeping. In the case of infrequent purchases, the individual is frequently incapable of recalling the exact expenditure, and his recollections may be seriously biased. The interview method, therefore, may have reporting errors. This

particularly true if the question of expenditure on food items is answered by the husband (man) and not by the wife (woman) of the household.

3.4 The Concepts and Definitions

The concepts and definition adopted in the National socio-economic Survey (SUSENAS) with regard to household, household members, consumption expenditure are given below.

3.4 1 Household

Households were classified as consisting of two types, i.e., ordinary households and special households. The latter type was excluded by the survey. An ordinary household was defined as a person or a group of person living in a (physical/census) building or a part thereof and usually sharing the same pot' Sharing the same pot means that everyday needs of the group were managed together as one unit. Other than the commonly found, i.e., a household consisting of a man, his wife, and his children, there are other types of ordinary household such as:

- A person who rented a room or part of census building and managed his/her own meals;
- A family who lived in two separate buildings, but 'share the same pot', where both buildings were in the same segment
- A boarding house with not more than ten boarders;
- The household of the managers of boarding institutions when it was separated from the institution, they managed.

3.4.2 Special Household

Special household includes:

- People living in an orphanage, residence hall, dormitory, hostel, prison, military barracks, and the like. However, military personnel who live with his or her family in barracks but managed his or her own meals separate from that of the barracks was not included;
- People living in boarding houses with not less than ten persons.

3.4.3 Household Member

Household members included each of those persons who formed a household regardless of whether he or she was present or temporarily absent at the date of enumeration. However, a household member who was on a journey for six months or longer, or less than six months but intended to move away for more than six months or longer, was not regarded as a household member. On the other hand, a person who has stayed for six months or longer, or had stayed for less than six months but intended to stay for more than six months, was regarded as a member of the household.

3.4.4 Consumption Expenditure

Household consumption was distinguishable between food and non-food and was limited to goods and services used for household purposes, omitting those items purchased for business or to be given away, regardless of their source of origin. The reference period for food consumption was one week. Average per capita expenditure of a household was obtained by dividing the number of household members into total consumption expenses of the household. Consumption expenditure includes items purchased as well as those produced on own account and used in final consumption.

3.4.5 Household income

Income is a flow concept and must be measured in amount per unit of time. The money income of a household encompasses *rupiah* (Indonesian currency) amounts received by household members from all sources, including salaries, wages, profits, return on saving, gifts, and inheritance etc. Many households receive income from several sources. The diversity and irregularity of income sources add to the difficulty of obtaining accurate reports of income. Income is probably under-reported by many respondents in SUSENAS.

CHAPTER IV. THEORETICAL FRAMEWORK

The main interest of this study is parameter estimates of demand function reflecting budget-allocation behavior of households in East Java, Indonesia. From these estimates, we can derive more indicative and predictive information in the form of food demand elasticity. This information will allow us to conduct a welfare analysis in order to measure the effect of any change in demand exogenous variable(s), on the household's consumption. Hence, the task of this study is to find a consumer expenditure model that delivers such information with most high capacity in describing and predicting the consumption behavior of the households in East Java, Indonesia, the study area. Our methodological choice is the econometric approach.

This study is therefore an empirical work in the form of econometric estimation of demand functions using a system approach. A system approach of demand analysis is characterized as follows:

- it is based on a certain underlying economic theory;
- it involves some assumptions to confine the scope of analysis;
- it uses an advancement of econometric techniques of estimation and inference;
- It follows any econometric algorithm or calculation methods to come to any expected quantitative results.

This chapter is presented to deal with the above issues. It addresses (i) the underlying economic theory; (ii) the assumptions made;.(iii) the principle(s) involved and methods used to transform the underlying theory to econometrically estimable model (iv) econometrical algorithm and techniques applied in this study.

The aim is not to expose in detail the treatment imposed on the theory itself. It is rather, to demonstrate the relevance between the model applied in this study with the theoretical plausibility and its fitness to the available data.

While the data issues have been addressed in previous chapter, we introduce the theoretical components in this chapter. The statistical procedure and its related issues will be presented in the next chapter.

The first part of this chapter will review briefly the consumer demand theory. The emphasis is in introducing (i) what the economic theory tells us about the behavior of consumer, and (ii) what treatment is needed to make that theory useful for our research question.

4.1 Neo-classical Theory of Consumer Behavior

Neo-classical consumer economics is concerned with the question of choice that consumers make during their budget allocation activities. It gives answer to the question of "which *consumption basket* the consumers take at time of *shopping* and why*?"* The consumer may be an individual or "a representation of individuals" acting as a decision unit of its member. This study regards the second type of consumer, i.e. the household instead of individual person, as a representing the decision unit of family members. The ***consumption basket*** contains a mix of all goods[14] the consumers purchase at given commodity prices and consumer's purchasing power.

The theory of consumer's demand behavior is founded on a very established building Blocks (Raunikar and Huang, 1987) constituting concepts of utility function, commodity set, and the axioms governing the ordering of consumer's preference. Expositions to describe how this theory works have been provided, among others, by Deaton & Muellbauer (1980b); Phlips (1983); Theil (1975), (1976) and Varian (1984). Delineation of the principle ideas is presented as follows.

Methodological questions of the work addresses the following theme:

(i) A Specification of a utility or Expenditure Functions.

(ii) A Specification of demand functions.

(iii) The Formula for theoretical restrictions.

(iv) The Formula for calculating elasticities: price (own price, cross price; ordinary, compensated), expenditure, specifics factors.

4.1. 1 Basic Concepts

The standard approach to demand analysis involves an attempt to estimate the following general demand equation (Houthakker and Taylor, 1992):

$$q_{it} = f_i(y_t, P_{it}, z_{1t}, z_{2t}, ..., z_{nt}, u_{it}) \quad \textbf{(4.1)}$$

where

[14] The goods we refer to, are any goods or services which generates satisfaction to the consumer

q_{it} = per capita consumption,
y_t = per capita income,
P_{nt} = Price of commodities,
z_{nt} = Household characteristics, and
u_{it} = error term.

a. Commodity Set

Commodities in the neo-classical framework are assumed to have following properties:

- non-negative
- Divisible
- Unbounded.

b. Preference Axioms

To assure that consumer preference may be represented by utility function with nice properties, consumer's preference is assumed to have to following properties:

- Completeness
- Asymmetry
- Transitivity
- Continuity
- Monotonicity
- Convexity
- Differentiability.

The first three properties ensure that consumer's preference is rational. Completness assumption implies that the consumer is able to rank the bundles and choose between them. This axiom is also called a comparability axiom (Phlips, 1983). The reflexivity assumption states that each bundle is as good as itself. The transitivity axiom assures that the consumer preference is consistent.

These three axioms are sufficient to guarantee a set of commodity bundles to which a consumer would be indifferent in preferring one over the other (Phlips, 1983). For the existence of a utility function which transforms the commodity bundles into utility, the continuity assumption is needed. The last four properties ensure that a continuous utility function that depicts a satisfaction level acquired from the consumption of the commodity bundle is "well behaving". Well behaving utility function enables someone to get a

quantitative information to be used to explain, to describe, or to forecast the consumer's behavior. Once the existence of utility function is postulated, two additional axioms are used to guarantee the best choice that maximizes consumer's utility. They are (a) non-satiation axiom, and convexity axiom. Non-satiation implies that consumer prefers more goods than less; and the convexity tells us that the average is preferable than the extremes. This axiom assures the existence of strict quasi-concave utility function. The assumption of quasi concavity of the utility function along with twice differentiability is used conventionally in consumer demand theory (Deaton, 1986).

c. Utility Function

Utility is the economic term for the satisfaction that consumer obtains from consuming good(s) and service(s). A rational consumer chooses the consumption basket, which generate the highest level of utility. On the ground of this postulate, one can derive a set of demand equations, the parameters of which an empirical researcher seeks to estimate. Once these parameters consistently are estimated, one can describe and predict the demand behavior of the consumer. Provided that the preference axioms are met and the commodity set performs properties as described above, the utility function will also in possession of nice properties: i.e. order preserving, monotonic, quasi concave, real valued and continuous (Debreu, 1959).

4.2 Setting-Up a Consumer Demand Function

The system of consumer demand functions is derived from a constrained optimization process. By budget-constrained maximization of utility function one obtains the *Marshallian* demand function. It begins with the supposition that consumer maximize their utility (u) as a function of what they consume (x_i) subject to a budget constraint. Noted mathematically, the objective of consumer is

$$\text{Max } U(x) \text{ subject to } \sum_{i=1}^{k} p_i x_i = y \qquad \textbf{(4.2)}$$

Using optimization techniques like the Lagrangian, one comes to the Marshallian demand function:

$$\boldsymbol{x} = \boldsymbol{x}\,(y, \boldsymbol{p}). \qquad \textbf{(4. 3)}$$

It is a relationship between the quantity of goods purchased, the prices and income.

4.3 Properties of Marshallian Demand Function

By manipulating the first order conditions presented earlier in (4.2) and (4.3) one can derives important properties pertaining the parameters of demand functions. The knowledge on this properties helps researcher in resolving the problem of estimation.

The results of changes in prices of commodities and income level of the consumer are described by the partial derivatives of first order conditions. There are in general, four basic properties of demand functions: namely, adding up, homogeneity, negativity, and symmetry that are important in providing a testable hypothesis to test the rationality of consumer behavior. The properties of demand functions guide the empirical analysis in testing consumer behavior from real world data. The properties are always effective irrespective of the form of utility function and take the form of mathematical restrictions on the derivatives of the demand functions.

4.3.1 Adding Up

Adding up condition comes from the budget restriction and the monotonic property of the preference. According to this property, because the representative consumer is assumed to spend exhaustively all of their income, the income or total expenditure should be the addition of the values of the Marshallian demand function. Formally, it is expressed as

$$P_1 q_1 + P_2 q_2 + \ldots + P_n q_n = y$$

which is the linear budget constraint given in (4.1). Substituting $q_1^*(P, y)$ for q_i we get

$$\sum_i p_i q_i(P, y) = y \qquad \textbf{(4.4)}$$

By writing in the elasticity notation, one obtains the following equation:

$$w_1 e_{1y} + \ldots + w_n e_{ny} = 1; \qquad \textbf{(4.5)}$$

where w_1 is the budget share of good 1, and e_{1x} is the income elasticity. This condition, which says the sum of weighted share of income elasticities, is equal to one; the weights being the budget shares of the commodities. This condition is known as an *Engel aggregation*.

By writing in the elasticity form, the following expression is obtained

$$w_1 e_{1j} + w_2 e_{2j} + \ldots w_j e_{jj} + w_j + \ldots w_n e_{nj} = 0 \qquad \textbf{(4.6)}$$

$$\sum_i w_i e_{ij} = -w_j$$

Where w_i is the budget share of good i, and e_{ij} is the cross price elasticity's of i^{th} and j the commodity and e_{jj} is the own price elasticity. This condition, which says that the sum of the own price and cross price elasticities weighted by their budget shares due to change in price of j^{th} commodity is equal to the negative of the change in price of j^{th} commodity, is known as *Cournout aggregation*.

4.3.2 Homogeneity

The Marshallian demand functions are homogeneous of degree zero in price and income, meaning that if we multiply all the prices and income by a constant k, the optimal quality demanded of commodities is unchanged.

According to Euler's theorem, if a function f(y) is homogeneous of degree θ, then derivatives of this function satisfy the following properties:

$$e_{i1} + e_{i2} + \ldots e_{in} + e_{ix} = 0 \quad \forall i \qquad \textbf{(4.7)}$$

where e_{ij} is the elasticity of demand i with respect to a change in price of good j; e_{ii} is referred to as own piece elasticity and e_{ij} is referred to as cross price elasticity; e_{iy} is the elasticity of demand with respect of a change in income known as income elasticity. Rewriting **(4.7)** as

$$\sum_j e_{ij} = e_{iy},$$

one says that the sum of all own and cross price elasticities is equal to the negative of the income elasticity. This condition given by the homogeneity property of demand function is also referred to as the row constraint. If there are n demand equations then there will be n restriction of the utility maximization problem with a budget constraint.

The homogeneity restriction is not particularly useful for single commodities studies since such studies seldom, if ever, include *all* prices and income (Currie, 1972).

4.3.3 Negativity

This property states that the (n x n) matrix formed by the $\frac{\partial q_i}{\partial P_j}$ is negative semi-definite. The negativity property places the following inequality restriction on s_{ij}; the diagonal elements must be non-positive for all i, $s_{ii}(\frac{\partial q_i}{\partial P_i}\Big|_{\bar{u}}) > 0$. This also follows from the assumption of quasi concavity of the utility function by which the second derivative with respect to any price is negative.

4.3.4 Symmetry

The Symmetry property of demand function follows from the Slutsky equation; for any price j

$$e_{ij} = e_{ji}\frac{w_j}{w_i} + w_j(e_{jy} - e_{iy})$$

Symmetry condition implies that if budget shares and one set of cross prices elasticities are known along with income and own price elasticities, another set of cross price elasticities could be calculated.

In applied demand analysis, the properties of demand functions discussed above have important implications in terms of testing the hypothesis of consumer theory, in imposing certain restrictions on the parameters of estimations and the expected signs of elasticities. By Engel aggregation in adding up property,

$$\sum_i w_i e_{iy} = 1,$$

So only n-1 of the income elasticities are independent.

By homogeneity property,

$$\sum_j e_{ij} + e_{iy} = 0$$

for each demand function there is one redundant elasticity and, therefore, n redundant elasticities for n equations. By the symmetry property it applies, that knowing the budget shares and one of the off-diagonal elements, the other set of off-diagonal could be calculated, which reduces the number of independent elasticities by $\frac{1}{2}(n^2 - n)$. In practice

to derive all price and income elasticities we need to estimates $n^2 + n$ parameters (n^2 price and n income elasticities). Using the properties of demand functions, namely homogeneity, Engel aggregation and symmetry, the number of independent parameters to be estimated can be reduced to

$$\left[(n^2 - n) - n - 1 - \left(\frac{n^2 - n}{2}\right)\right] = \frac{n^2 + n}{2} - 1.$$

This is very useful when the applied researcher is faced with the problem of a small number of goods to be analyzed is 10, and then the total number of elasticities to be estimated is 110. However, using the above restrictions, only 54 parameters need to be estimated. Also, expected signs of elasticities can be derived from these restrictions. For example, using homogeneity, if all cross elasticities and the income elasticity for a good are positive then own price elasticity should be negative.

An alternative to derived demand functions is made available by duality principle. This is achieved by introducing the indirect utility function. This is done by inserting demand function $q = q\,(y, p)$ into a utility function U = U (q) to give maximum attainable utility as a function of y and p, noted as

$$U^* = U\,[q^*\,(y, p)\,] = \Phi\,(y, p).$$

The function $\Phi\,(y, p)$ is the indirect utility function. It indicates the monetary value of maximum utility as a function of price and income. The indirect utility function has the properties of (i) continuity; (ii) monotonicity (non decreasing in Y; (iii) quasi-convexity; (iv) zero homogeneity in P and Y; and (v) using derivative property, the Marshallian demand function could be retrieved from indirect utility functions by applying Roy's Identity (Roy, 1942) according to which

$$q_i(P,Y) = -\left[\frac{V(P,Y)}{P_i} \Big/ \frac{V(P,Y)}{Y}\right]$$

That is duality approach. As demonstrated above, duality theorem suggests that by making $Y^U(\bullet)$, the value of the income constraint in the maximization problem defined by eq. (2), then the optimized value of utility in that problem will be equal to U^o, parallel to utility maximization subject to an expenditure constraint, one can derive demand functions by minimization of expenditures subject to a utility constraint.

$$\min_{\{x_i\}} Y = \sum_{i=1}^{n} P_i x_i \quad \text{so that } U^0 = U(x_1, \ldots, x_n) \tag{4.8}$$

The duality theorem implies that the solution to the maximization problem is identical to the solution of its minimization dual when the constraint to the maximization problem is appropriately defined. By applying this principle, the behavior functions for the x_i's are solved simultaneously for the primal and the dual. Simply put, this means that the levels of the solution values are the same. That is, $x_i^M = x_i^U$ as can be seen in the graph in the two goods case. But it also means that equations (3) and (4) are equal at that point.

Marshallian demand function is observable but not predictive. The Hicksian is predictive but not observable. Combining both is the advantage of using the duality principle.

By using of duality principle, the demand functions may be established from derivation of cost function, the minimum cost of obtaining a fixed level of U at given price. Deriving the cost function with respect of price (Shepard's Lemma) leads to Hicksian or compensated demand functions. Hicksian demand function is the relationship between the goods purchased, prices and utility.

This result has important implications in applied demand analysis. If a functional form is assumed for V (P, Y) then the estimable form of Marsallian demand equations could be derived using Roy's identity and will have the same structure as the ones derived from direct utility function (Barten and Bohm, 1982). The approach to derive demand functions using indirect utility function is also amenable for applications in welfare economics and index number analysis since it represents the allocations to achieve the maximum utility levels under different prices and income (Jorgenson et. al., 1982).

4.4 Cost Minimization and Hicksian Demand Function

In the utility maximization approach of deriving demand functions for commodities, the consumer's problem was to maximize utility for a given level income. The optimizing solution of this problem was used to attain some utility level of U. If reformulated as one of choosing the commodities to minimize the total expenditure to reach the same level of U, then this problem is described as a *dual* problem of the former approach. The expenditure minimization problem is given by

$$\min_{q} P^1 q \text{ subject to } \quad U(q) = \overline{U}\ . \tag{4.9}$$

The solution of this constrained optimization problem is a set of quantity demand functions which are functions of P and U,

$$q_i^* = h^i(P,U)$$

The demand function is called Hicksian or compensated demand functions. The minimized expenditure or cost to achieve a certain level of utility U given the price vector *P* is

$$P^l q^* = Ph(P,U) = C^*(P,U).$$

This is known as the expenditure function or cost function. The properties of *C* (P, U*) are useful in understanding the restrictions on the demand functions. They are useful in understanding the restrictions on the demand functions. They are summarized as (i) *C (P,U)* is continuous in *P* and *U*; (ii) it is non-decreasing in *P* and *U* (monotonically); (iii) homogenous of degree one in price; (iv) concave in prices; and (v) by the derivative property the Hicksian demand functions could be retrieved from the cost functions using Shepard's lemma (Shepard, 1953),

$$h_i(P,U) = \frac{\partial C}{\partial P_i}.$$

The indirect utility function could be derived by inverting the cost function and vice versa using Shepard-Uzawa duality theorem (McFadden, 1978; Diewert, 1974, 1980). The Marshallian demand functions could be derived by substituting the inverse of expenditure function into the Hicksian demand function (Deaton and Muellbauer, 1980b). Using appropriate functional forms in the cost function the demand function could be derived for applied empirical work (Deaton and Muellbauer, 1980a).

4.5 Special Utility Structures

In addition to the information provided by the theoretical properties of demand functions, the assumption of specific form of utility function imposes yet further conditions. The choice of a specific form for the utility function depends on prior knowledge of the consumer's preference structure. Very common behavior assumptions embedded in specifications of utility functions are separability and additively. The restrictions that these concepts imply for the demand parameters along with their behavioral consequences are summarized below.

4.5.1 Separability

The separability idea postulates that commodities which interact closely in yielding utility can be grouped together while which interact only in a general way through the budget constraint are kept in separate groups (Sadoulet and Janvry, 1995). In most of the empirical analysis of the demand system, the use of aggregate data for quantities such as food, clothing and housing is common along with their price indices, rather than individual quantities of elementary commodities q_i and their prices P_i as described in the theory. The use of such aggregate data requires the assumptions that the utility function is separable in these aggregate, a condition under which decisions involving these aggregates give a utility level that is equivalent to the one that would be articulated in terms of individual commodities.

Separability in general implies that the marginal rates of substitution between pairs of good in separated goods are independent of the level of commodities consumed outside that group (Phlips, 1983: The concept of separability allows the use of aggregate data and is consistent with optimization by stages.

4.5.2 Aggregation over Consumers

The market demand functions are defined as the horizontal summation of the individual demand functions of all the consumers under competitive market conditions. If the individual household's demand function for the i^{th} good is given by

$$q_i^h = q_i^h\left(P, y^h\right); \qquad \text{h} = 1, \ldots \text{H} \tag{4.10}$$

Aggregation over consumers deals with the transition from the individual household behavior to the analysis of the market demand. Two issues are important in the analysis of aggregation: (1) under what demand function does

$$(P, y^1, y^2, \ldots, y^h = \bar{q}_i\left(P, y^h\right)$$

and (2) does $q_i\left(P, \bar{y}\right)$ have the same properties as

$$q_i^h\left(P, y^h\right).$$

Intuitively, if in aggregate demand function $\bar{q}_i\left(P, \bar{y}\right)$, price and average income do not change then $\bar{q}_i$ remains the same; Hhowever, if the marginal propensity to consume (MPC)

changes due to income redistribution, then the above aggregation may not hold. Let us have the following linear function $q_i^h = a_i^h(P) + b_i(P)y^h$ in which $b_i(P)$, the marginal propensity to consume is the same for all consumer in the market, then $f_i(P, y^1 .. y^H) = \bar{q}_i(P, \bar{y})$ is satisfied.

4.6 Empirical Demand Systems

In general, there are three broad approaches to specify applied demand systems. The first approach is to derive a system of demand equations from utility maximization problem assuming specific form of utility functions. The linear expenditure system and indirect addilog model are example of this approach. The second approach is deriving demand system based on an approximation on an arbitrarily specified functional form, as in the Rotterdam Model, transcendental logarithmic system, and almost ideal demand system (AIDS) (Deaton, 1986, Pollak and Wales, 1992). The third methods is to construct model with *ad hoc* (naive model, see Deaton 1986) specifications directly imposing theoretical restrictions as in generalized addilog model and Theil's multinomial extension of the linear logit model. An understanding of the use of these demand systems for different purposes and situations and their limitations is helpful in selecting appropriate models to work with and assess the validity of the empirical results from implementing them. Detailed reviews of these demand systems are given by Barten (1977), Johnson et al. (1984), Deaton (1986) and Bewley (1986). Also a number of comparative studies of demand systems have been carried out to evaluate the appropriateness of this model. (Park, 1969, Yoshihara, 1969, Goldberger and Gamaletsos, 1970, 1973; Deaton, 1974; Theil, 1975, 1976; Lybeck, 1976; Pollak and Wales, 1978). Examples of these approaches to empirical demand systems are reviewed here to form a basis for further review of applied food demand studies of developing countries in general and the demand studies from Indonesia in particular. Some of these extensions of these models with recent advances are also discussed.

4.6.1 Linear Expenditure System (LES)

The LES was introduced by Klein and Rubin (1948 - 1948) in an attempt to construct a true cost-of living index. This system is the first empirical estimation of a system of demand equations satisfying all general restrictions. Stone (1954) showed that the only linear form

of demand systems that satisfy the theoretical restrictions of adding up, homogeneity, and symmetry is the LES.

The direct utility functions for the LES is of the Stone-Geary form

$$U(q) = \Pi(q_i - C_i)^{bi} \qquad \sum_i b_i = 1 \tag{4.11}$$

Where C's are subsistent requirement of q_i and b_i is marginal budget share.

Maximizing (4.12) subject to budget constraints results in Marshallian demand equations given by

$$q_i = C_i + \frac{b_i}{P_i}(Y - \sum_j P_j C_j) \tag{4.12}$$

Where $(Y - \sum P_j C_j)$ is the available income to allocate among goods in a fixed proportion b_i, and is termed as a supernumerary expenditure. Substituting it in U (q), the indirect utility function is given by

$$V = \frac{(Y - \sum P_j C_j)}{b_0 \Pi P_j^{bj}}; b_0 = \Pi b_i^{bi} \tag{4.13}$$

The cost function derived from the inversion of the above indirect utility function can be written as (Deaton and Muellbauer, 1980b)

$$C(U,P) = \sum P_k C_k + U \prod_{k=1}^{n} P_k^{bk} \tag{4.14}$$

Where $\sum P_k C_k$ is the fixed cost on subsistence requirement with no substitution, and ΠP_k^{bk} is the term that allows for the utility to be attained at a constant price per unit.

The linear expenditure system can be derived by differentiating **(4.14)** with respect to prices using Shepard's lemma and substituting in the indirect utility function;

$$P_i q_i = C_i P_i + bi(Y - \sum P_j C_j) \text{ = 1, n goods} \tag{4.15}$$

The number of parameters to be estimated is 2n (n of C's and n of b's). Given constraint imposed by $\sum b_i = 1$, the LES needs only (2n-1) parameters to be chosen independently. The adding up and symmetry conditions are satisfied by imposing the following restrictions on the parameters of the utility function (12), $\sum b_i = 1$ and $0 < b_i < 1; q_i < C_i$ respectively.

The income elasticity for commodity is given by

$$e_{iy} = \frac{b_i}{w_i} \ , \qquad \textbf{(4.16)}$$

where $w_i = \frac{b_i}{y}$ is the average budget share. The marginal budget shares for LES are then given by $b_i = e_{iy} w_i$.

The own price elasticity for commodity i is given by

$$e_{ii} = -1 + (1 - bi)(\frac{C_i}{q_i}) \qquad \textbf{(4.17)}$$

and the cross-price elasticity between good i and price of good j is given by

$$e_{ij} = -b_i(\frac{P_j C_j}{P_i q_i}) \text{ for all i = j} \qquad \textbf{(4.18)}$$

It means that for LES, all goods are gross complements (Jonhson et al. 1984).

The LES incorporates the restriction implied by an additive utility structure, thus maintaining strong separability assumptions with price and expenditure elasticities proportional (Deaton, 1974). This condition is appropriate only for broad groups of commodities, which restrict the use of LES in disaggregated commodity analysis. The restriction $0 < b_i < 1$ implies that all income elasticities are positive, thus not allowing for negative income elasticities such in inferior goods. Because of view parameters, LES is applied in cases where data are scarce and less parsimonious model cannot be used (Lluc, Powell, and Williams, 1977). Despite these limitations, however, experience with LES shows that it is a reasonable model, if the good are broadly grouped and price variations within these groups are restricted (Phlips, 1983).

A generalized version of the linear Expenditure System (GLES) was developed by Wales (1971) incorporating the concept of elasticity of substitution between the uncommitted expenditures; in this version Budget share is given by

$$w_i = C_i \frac{P_i}{Y} + \left[\frac{q_i p_i^{-\sigma}}{\sum_{k-1}^{n} q_k P_k^{1-\sigma}} \right]^{\frac{P_i (Y - \sum_{k-1}^{n} P_i C_i)}{Y}} \qquad \textbf{(4.19)}$$

Where σ the elasticity of substitution and LES is is a special form of GLES with $\sigma = 1$. Another extension of the linear expenditure system has been to incorporate inter- temporal effects (Lluch, 1973) and could be written as

$$P_{it}q_{it} = P_{it}C_{it} + b_{it}(w - \sum_{t}\sum_{k} P_{tk}^{*}C_{tk}) + V_{it} \quad \textbf{(4.20)}$$

where C_{it} and b_{it} are parameters specific to periods t which vary over the life cycle, W is the current discounted value of present and future income and current financial assets, P_{tk}^{*} current discounted price of good k in the future period t and V_{it} is the error term. Blundell and Ray (1982) and Ray (1985) have proposed and estimated non-additive versions of LES. Green et al. (1980) and Blanciforti et al. (1986) formulated dynamic version of the LES in which habit formation has been incorporated.

4.6.2 Indirect Addilog Model (IAD)

The indirect addilog demand system or simply the addilog model is derived from additive indirect utility function (Houtakker, 1960).

$$V(P, y) = \sum_{i=1}^{n} a_i (\frac{y}{P_i})^b \quad \textbf{(4.21)}$$

Where a and b are parameters with $\sum a_i = -1; \quad q_i b_i > 0$ and $0 < b_i < -1$. Using Roy's identity to derive addilog demand functions,

$$q_i(P, y) = \frac{a_i b_i (\frac{y}{P_i})^{1+bi}}{\sum_{k=1}^{n} a_k b_k (\frac{y}{P_k})^{bk}} \quad \textbf{(4.22)}$$

In the log form the addilog model is written as (Someryer, 1974; Theil, 1975)

$$\ln q_i = \ln a_i b_i + (1 + b_i)\ln(\frac{y}{P_i}) - \ln \sum a_i b_i (\frac{y}{P_i})^{bi} \quad \textbf{(4.23)}$$

Which satisfies Engel aggregation and Cournot aggregation; and the substitution matrix is negative semi definite given by $b_i > 1$. However, only quasi-concavity of the utility function is required for negative definiteness, which implies that at most one b can be equal to minus one (Murty, 1982. The income and price elasticities of addilog demand systems are given by Johson et al., 1984.

The income elasticity is

$$e_{iy} = (1 + b_i) + b_j w_j \text{, for all i} \quad \textbf{(4.24)}$$

where $e_{iy} \lessgtr b_j w_j$

the own-price elasticity is

$$e_{ij} = -(1 + b_i) + b_i w_i \text{, for all i} \quad \textbf{(4.25)}$$

where $1 < e_{ii} < 0$ with $-1 < b_i < 0$ and $w_i > 0$;

and the cross price elasticity is

$$e_{ij} = b_j w_j \text{ for all } i \neq j \quad \textbf{(4.26)}$$

that depends only on the commodity, whose price is changing, and not on the good whose quantity is responding. The complete set of demand parameter in addilog demand system can be estimated with 2n -1 independent coefficient (n for b_i's and n-1 for a_i's.). A review of demand systems that are approximations of true unknown demand structures such as the Rotterdam Model, the transcendental logarithmic demand systems and the almost ideal demand system is presented below.

4.6.3 Rotterdam Model

The demand system is started with specific algebraic demand system and then the general restrictions are imposed to make it consistent with the theory of consumer demand (Theil, 1965, Barten, 1964). The relative price version of this system begins with Stone's (1954) logarithmic demand function:

$$\ln q_i = a_i + e_{iy} \ln y \sum e_{ij} \ln P_j . \quad \textbf{(4.27)}$$

Writing the above equation (3.48) in differential form yield

$$d \ln q_i = e_{iy} d \ln Y + \sum e_{ij} d \ln P_j \quad \textbf{(4.28)}$$

Multiplying by the budget share (2.50) can be expressed as

$$w_i d(\ln q_i)(= b_i d \ln \bar{Y} + \sum C_{ij} \ln P_j \text{ ,} \quad \textbf{(4.29)}$$

where

$$d\ln\bar{Y} = d\ln Y - \sum w_k d\ln P_k$$

$$b_i = w_i e_{iy} = P_i \frac{\partial q_i}{\partial Y},$$

and

$$\mathbf{C_{ij}} = w_i e_{ij} = \frac{\mathbf{P_i P_j S_{ij}}}{Y}.$$

$\mathbf{S}_{ij}$ is the (i, j) term in the Slutsky substitution matrix. The total differential of the budget constraint is

$$\sum_{i=1}^{n} P_i dq_i \sum_{i=1}^{n} q_i dp_i = dY \qquad \textbf{(4.30)}$$

In logarithmic terms,

$$\sum_{i=1}^{n} w_i d\left[\ln q_i\right] + \sum_{i=1}^{n} w_i d\left[\ln P_i\right] = d\ln Y \qquad \textbf{(4.31)}$$

The basic idea underlying the Rotterdam model is to view the demand theory as a budget sharing process for the consumer. Accordingly, budget shares and the changes in them are of interest rather than the actual quantities consumed. Changes in value shares consist of three components: changes in income, prices, and quantity consumed. Since changes in income and prices are assumed to be given in demand theory, the only component behaviorally determined is the changes in quantity consumed. Following Barten (1969), a typical equation of the absolute price version of Rotterdam model can be written from **(4.31).**

$$\bar{w}_{it}\Delta\ln q_{it} = \mathrm{a_i} + \mathrm{b_i}\sum_k \bar{w}_{kt}\Delta\ln q_{kt} + \sum_k \mathrm{C}_{ik}\Delta\ln P_{kt} \qquad \textbf{(4.32)}$$

Where Δ stands for the first difference operator over time, $\mathrm{q_{it}}$ and $\mathrm{P_t}$ are respectively the quantity consumed of, and the price paid for the $\mathrm{i^{th}}$ commodity in period t and t-1. $\mathrm{a_i}, \mathrm{b_i}, \mathrm{C_{ik}}$ (i, k = 1, 2, n) are the parameters interpreted as the intercepts, the income and price coefficients, respectively.

The adding-up restriction in Rotterdam model implied

$$\sum_{i=1}^{n} \mathrm{b_i} = 1; \quad \sum_{k=1}^{n} \mathrm{C_{ik}} = 0; \quad \mathrm{k} = 1, 2 \ldots \mathrm{n}.$$

The homogeneity can be enforced by imposing the restriction

$$\sum_{K=1}^{n} C_{ik} = 0$$

and the Slutsky symmetry restriction is given by

$$\mathbf{S_{ik}} = \mathbf{S_{ki}}.$$

The income elasticity is given by

$$e_{iy} = \frac{b_i}{w_i}.$$

The income elasticities are positive if b_i's are positive. Also it could be noted that

$$e_{iy} \begin{matrix} > \\ = \\ < \end{matrix} 1 \quad \text{when} \quad b_i \begin{matrix} > \\ = \\ < \end{matrix} 1.$$

Thus, if $b_i > w_i$, the commodity is a luxury item. The own price and cross price elasticities are given by

$$e_{ii} = \frac{(\mathbf{C_{ii}} - \mathbf{C_{ii}}\mathbf{b}_i - \mathbf{b_i}\mathbf{w_i})}{w_i} \qquad \textbf{(4.33)}$$

and

$$e_{ij} = \frac{(\mathbf{C_{ij}}\mathbf{b_j} - \mathbf{b_i}\mathbf{w_i})}{w_i} \qquad \textbf{(4.34)}$$

The parameters of the demand system can be significantly reduced if additivity restriction is further imposed (Johnson et al., 1984). Then, the required number of parameters is only (n + 1) to form a complete set of demand elasticities.

4.6.4 Transcendental Logarithmic Demand System

Instead of starting with a specific indirect utility function, Christensen, Jorgensen and Lau, (1975) approximate the true indirect utility function with a second order Taylor series expansion. The indirect utility function of the trans log model is given by,

$$\ln V = \alpha_0 + \sum_{i=1}^{n} a_{ji} \ln\left(\frac{P_j}{y}\right) + \frac{1}{2} b_{ji} \ln\left(\frac{P_j}{y}\right) \ln\left(\frac{P_i}{y}\right) \qquad \textbf{(4.35)}$$

Using Roy's identity the trans log demand system can be written as

$$w_j = \frac{a_m + \sum_{i=1}^{n} b_{ij} \ln\left(\frac{P_i}{y}\right)}{a_m + \sum_{j} b_{mi} \ln\left(\frac{P_i}{y}\right)} \quad \textbf{(4.36)}$$

where

$$a_m = \sum_{j=1}^{n} a_j; \quad b_m == \sum_{j}^{n} b_{ji}.$$

Thus, the demand system uses normalized prices with respect to income. Normalization $a_m = -1$ is imposed to identify the parameters of the consumer demand or expenditure share equation in **(4.35).**

The income elasticity for the indirect translog demand system is given by

$$e_{jy} = 1 + \frac{-\sum_{i} b_{ij} / w_j + \sum_{j}\sum_{i} b_{ij}}{-1 + \sum_{j}\sum_{i} b_{ji} \ln(P_i / Y)}. \quad \textbf{(4.37)}$$

The own price elasticities is given by

$$e_{jj} = -1 + \frac{b_{jj} / w_j - \sum_{j} b_{ji}}{-1 + \sum_{j}\sum_{i} b_{ji} \ln(P_i / Y)}; \quad \textbf{(4.38)}$$

And the cross-price elasticity is given by

$$e_{ji} = \frac{b_{ji} / w_j - \sum_{j} b_{ji}}{-1 + \sum_{j}\sum_{i} b_{ji} \ln(P / Y)}. \quad \textbf{(4.39)}$$

The translog demand system has been widely in applied demand analysis (Christensen et al., 1975; Jorgensen and Lau, 1975).

4.6.5 Almost Ideal Demand System (AIDS)

The almost ideal demand system (AIDS) that is introduced by Deaton and Muellbauer (1980a) starts with a class of preference called the price-independent generalized

logarithmic (PIGLOG). The aim of using this class of preference is to ensure that the necessary and sufficient conditions for consistent aggregation across consumers are satisfied. The log of the cost or expenditure function is represented by the following equiation:

$$\log C(\boldsymbol{p}; u) = (1- u) \log a(\boldsymbol{p}) + u \log b(\boldsymbol{p}).$$

This cost function gives an arbitrary first-order approximation to any demand system. It satisfy the axioms of choice, aggregates perfectly over consumers, has a functional form which is consistent with household budget data, and simple to estimate and test the true restrictions of demand theory. It also combines the best of theoretical features of both Rotterdam and trans log models. The formulation of AIDS uses the duality theory and expenditure function instead of utility or indirect utility function. By taking a specific functional form for log $a(\boldsymbol{p})$ and log b(p) as, then the AIDS cost (expenditure) is function in natural logarithmic form is specified as

$$\ln C(U,P) = a_0 + \sum_i a_i \ln P_i + \frac{1}{2}\sum_i \sum_j \gamma_{ij}^{*} \ln P_j P_i + \overline{U}\, b_0 \sum_i P_i^{bi} \qquad \textbf{(4.40)}$$

Where a_i, b_i and γ_{ij}^{*} are parameters. $\overline{U}$ is the utility level and P_j are prices. The expenditure function is linearly homogenous in P, provided

$$\sum a_i = 1; \sum_j \gamma_{ij}^{*} = \sum_i \gamma_{ij}^{*} = \sum b_j = 0 .$$

It is also consistent with aggregation over consumers. Differentiating the expenditure function using Shepard Lemma yields

$$w_j = a_j \sum \gamma_{ij} \ln P_i + \overline{U}\, b_0 b_j \exp\left[b_{jy} \ln(P_{ij})\right] \qquad \textbf{(4.41)}$$

Substituting for $\overline{U}$, which is the indirect utility function derived the expenditure function

$$w_j = a_j + \sum a_{ij} \ln P_i + b_j \ln \left(\frac{Y}{P^{*}}\right). \qquad \textbf{(4.42)}$$

where,

$$\ln P^{*} = a_0 + \sum_i a_i \ln P_i + \frac{1}{2}\sum_i \sum_j \gamma_{ij}^{*} \ln P_i \ln P_j \qquad \textbf{(4.43)}$$

is an overall price index, which could be replaced by Stone's (1954) index in empirical applications since **(2.41)** is highly non-linear. The Stone's index is given by

$$\ln P^{*} = \sum_{i} w_i \ln P_i \qquad \textbf{(4.44)}$$

When Stone's index is used in **(4.41)** the model is termed as linear approximation of almost ideal demand system (LA/AIDS).

There are three sets of restrictions on the AIDS model given by

$$\sum_{i=1}^{n} a_i = 1,$$

$$\sum_{i=1}^{n} \gamma_{ij}^{*} = 0,$$

$$\sum_{I=1}^{n} b_i = 0;$$

$$\sum_{j}^{n} \gamma_{ij} = 0,$$

and

$$\gamma_{ij} = \gamma_{ji}$$

which should hold for the AIDS model to represent a system of demand equations (which add up to total expenditure ($\sum w_i = 1$), are homogenous of degree zero in prices and total expenditure, and satisfy Slutsky symmetry. The Slutsky coefficients are given by

$$S_{ij} = \gamma_{ij} + w_i w_j - w_i \delta_{ij} \qquad \textbf{(4.45)}$$

where δ_{ij} is the Kronecker delta (i.e. $\delta_{ij} = 1$ when i = j and equals 0 when otherwise). The Marshallian and Hicksian measures of elasticities can be computed from estimated parameters of the LA/AIDS model as follows:

$$e_{ii} = -1 + \frac{\gamma_{ii}}{w_i} - b_i \quad \textbf{(4.46)}$$

$$e_{ij} = \frac{\gamma_{ij}}{w_i} b_i (\frac{w_j}{w_i}) \quad \textbf{(4.47)}$$

$$d_{ii} = -1 + \frac{\gamma_{ii}}{w_i} w_i; \quad \textbf{(4.48)}$$

and

$$d_{ij} = \frac{\gamma_{ij}}{w_i + w_i} + e_j \quad \textbf{(4.49)}$$

where e denotes Marshallian elasticities and d denotes the income compensated or Hicksian measure. Expenditure elasticities can be obtained using

$$e_{iy} = 1 + \frac{b_i}{w_i} \quad \textbf{(4.50)}$$

The restrictions of demand theory can be imposed during estimation and tested easily with AIDS. There are several applied studies using AIDS including Deaton and Mullbauer (1980a) for Great Britain; Sergenson and Mount (1985), Hein and Pompelli (1985), Blanciforti and Green (1983), and Hayes et al. (1988) for the United States; Mergos and Donatos (1988) for Greece; Fulponi (1989) for France; and Ray (1980, 1982) for India.

4.7 Welfare Analysis

One advantage that dual approach offers in exploring the properties of optimal decision rules is that it provides a way to investigate benefit cost analysis of any proposed policy change. As expressed before, the expenditure function measures the household willingness to pay to reach a certain utility level at given good's price level. So it suggests measuring welfare effects of any economic change, for example price change.

So do the demand estimates from the AIDS model. As the model is derived from cost function, it is useful not only because they can be used to construct price and income elasticities but also useful to characterize the structure of the underlying cost function. By using the estimated elasticities, we can infer in what direction and how much demand are going to change. By using the information on consumer's preferences contained in the cost

function, we can evaluate the welfare effects of different price policies on households of different income groups. Therefore, in this study attempts was made by static simulation, to measure welfare losses for each income group under different pricing or subsidy scenario. This includes changes in prices of commodity groups for which the government of Indonesia intervenes directly or indirectly in fixing the consumer prices. Also changes in prices of commodities mainly consumed by low income household. This may be single and or multiple changes for example in price of rice, tobacco etc.

4.7.1 Welfare Measures

In analyzing demand function, cost functions and consumer demand functions themselves provide the basis for welfare analysis of price changes. There are at least four alternative welfare measures derived from theory of demand. These are:

- Index numbers (e.g. true index of cost of living)
- Marshallian consumer surplus
- Compensation variation
- Equivalent variation

Index numbers are commonly used for two reasons:

- as relative welfare measures (e.g., cost of living index, standard of living index); and
- as means of generating price and quantity index for a commodity group (e.g., food, capital, etc.).

A true cost-of-living index gives us an idea on how the minimum cost to consumers of achieving a particular reference level of economic welfare changes as prices change. The key assumption underlying the idea is that consumers behave as if they are minimizing the cost of achieving any given level of economic welfare. N principle the objective of using the index numbers is to present a summary of economic information about a group of commodities.

For relative welfare measures, the group of commodities includes all commodities relevant to an economic agent. For price and quantity index, the group of commodities involves only a subset of all the commodities relevant to a decision-maker (e.g., food, capital, etc.).

Consumer surplus (CS), compensating variation (CV), and equivalent variation (EV) rely on the demand functions. Consumer surplus uses Marshallian demand function, whereas CV and EV use Hicksian demand function as a basis of analysis. In the absence of income effect of price change, both Marshallian and Hicksian demand functions are identical. So the measure derived through CS, CV and EV are the same? Conversely, if the income effect of price change is present, this money metric resulted from the three is not equal.

4.7.2 Marshallian Consumer Surplus

Marshallian consumer surplus measures the change in welfare resulting from a price change in monetary terms. It expresses the benefit that a household obtains from buying good. This welfare measure can be described by way, in which demand of any household on a certain good is expressed as a demand schedule.

Consumer's surplus equals the total that any household would pay minus the amount that it actually does pay for the quantity bought.

It is expressed mathematically as follows:

$$CS = -\sum_{i} \int_{0}^{1} x_i(p,m)\, dp_i + \nabla m \qquad \textbf{(4.51)}$$

Where 0 represents an initial situation and the 1 is the final situation.

It should be noted that consumer's surplus as a measure of welfare consumer's welfare is only valid consistently when the marginal utility of income is constant. This condition is only fulfilled when the preferences is homothetic; and secondly if there is no income effect when the price of a commodity changes.

As a welfare measure, the surplus derived from the Marshallian consumer's surplus are not unique, i.e., path dependent (see Silberberg, 1978).

4.7.3 Compensating and Equivalent Variations

Introduced by J. R. Hicks (1942), compensating variation and equivalent variation are money metric (monetary measures) of the gain or loss in consumer's welfare following an economic change. The economic change may be introduced trough price change by government or another shocks taking place in economic environment.

- ***Compensating Variation***

Compensating variation is the compensating payment (amount of money) that leaves the consumer as well of as before the economic change. It may positive or negative. It is positive, if the economic change makes consumer worse off, and negative, if the economic change brings betterment to the consumer.

Welfare analysis utilizing compensating variation approach uses past information to estimates amount money needed to compensate Household to keep them stay at the level of wellbeing before the (price) change. Technically it means a nominal money value required to keep the consumers at utility level they enjoyed before he change. When a consumer's situation is changed from situation 1 to situation 2, the compensation variation is defined as (Just et al. 1982:85) „ the amount of income which must be taken an away from a consumer (possibly negative) after a price and/or income change to restore the consumer's original welfare level". It is formalized as

$$CV = C\left(u^0, p^1\right) - \left(u^0, p^0\right) \tag{4.52}$$

ce the Hicksian demand functions are the derivatives of the cost function, integration also gives the differences in costs of reaching the same level of well-being two different price situations. And so

$$CV = -\int_{p^1}^{p^0} \sum_i x_i\left(p, u^0\right) dp_i + \nabla m \tag{4.53}$$

- ***Equivalent Variation***

Equivalent Variation is the compensating payment that in the absence of the economic change moves the consumer to the welfare level associated with the change. So EV is a maximum amount the consumer would be willing to pay to avoid the change.

. Formally it is stated as

$$EV = c\left(u^1, p^1\right) - c\left(u^1, p^0\right) \tag{4.54}$$

In term of compensated demand function it is expressed as

$$EV = -\int_{p^0}^{p^1} \sum_i x_i\left(p, u^1\right) dp_i + \nabla\, m\,) \tag{4.55}$$

Hicksian demand functions can be derived from cost function using Sheppard's lemma:

The compensating Variation is especially important for policy analysis because it gives the actual amount of money required to leave the consumer at least as well off as before the change in the pricing policy.

CHAPTER V
METHODS AND STATISTICAL PROCEDURES

This chapter presents the procedures applied in the estimations and related works. It includes the discussions on data handling, classification of expenditure classes for rural and urban households, the procedures of estimation and the statistical tests used. In addition, this chapter presents also a discussion of econometric issues on the data used. Specific section of this chapter addresses the estimation procedures for the AIDS Model.

5.1 Data Handling

Because the SUSENAS data was compiled not directly for the purposes of this study, we need first to transform the data to meet the requirement for this study. This includes issues on the grouping methods for the commodities, the issue on price of individual commodity versus price of commodity-group, and the issue on the zero expenditure phenomena.

5.1.1 Commodities Grouping

For conciseness, and moreover for estimation reasons, we need in the empirical work a small number of commodities to reduce the variables to be analyzed. Or, we need to summarize the information through a grouping of the goods, when they display a similar role in determining consumer's behavior. In addition, the price of close substitutes such as meat, eggs, and fish, are very likely to move together, and hence grouping them into one commodity would bring no serious problem. We need to group the goods, because there is a believe saying, that nutritional superiority of any food or group of commodities may lead consumers to make a priority of spending. Moreover, it is justified to assume, that cross price effects among highly aggregated good is vanish; so that, the grouping of commodities is justified (Theil, 1975),

Since economic theory does not provide any easy guidance on the number of composition of food groups in an empirical work, we decided to group the commodity items on an *ad-hoch* basis. However, the spirit of plausibility is highly respected. Accordingly, in this study we grouped the food items based on the following considerations:

1. Nutritional content and sources. Based on this principle, food items with similar nutritional constituents or sources (e.g. carbohydrate source or cereal, animal products, etc.) were brought together into one commodity group;
2. The food price policy perspective: Food items being subject of food policy measure were considered to be one group. Special for Indonesian case, the policy makers might be interested to know the relationship between rice as a group to other food groups, especially a group of foods assumed to be its substitute, like sweet potatoes, cassava, wheat, *sago* and other starch containing food stuff. Because of that, these food goods are then grouped to be a single group of food. Recently, there is also an interest to know, if there is a potential for process foods (manufactured foods) to be the substitute for rice. It might be the case, that through processing, food groups previously considered to be inferior by Indonesian households have become upgraded culturally. So that, it might become a substitute for instance, for rice. If this is the case, then food diversification strategy may be achieved by manufacturing domestically endowed food stuffs, like the ones mentioned above. To capture such information, one needs to have a clear cut guideline in distinguishing the rice to manufactured food. This reasoning is adapted into this study as strategy to compose the food group.
3. Consumption or expenditure pattern on food commodities, i.e. the substitution or complementarity of food items.
4. The form of aggregation in which the data is available.
5. Consideration of a parsimonisity: This principle seeks to include a minimum number of commodity groups with a powerful explanatory character. On this basis, thus, all non-food expenditures for example, were aggregated into a single group.
6. The past studies of the Indonesian food sector.
7. Pattern of diet of the households, the behavior of which is under investigation.
8. The need to have relatively small group of food items.

In this study, non-food goods have been excluded from the demand systems by assuming separability of the utility function. This exclusion should not be so harmful in the context of a developing country like Indonesia, where a great portion of the budget goes to food expenditure as shown by the following table. The exclusion of the durable goods group is also based on the fact, that this study used a static model. To capture preference on durable

goods, one needs to cope with time dimension. This however, cannot be explained by a static demand system since time dimension is very crucial in the decision to spend on a durable good.

Based on these arguments it was decided to estimate a demand system for eleven commodity groups. Food is composed of eleven (11) commodities groups: consisting of rice (denoted as WR), non-rice staples (WNR), Fish (WFS), meat (WM), eggs and Milks (WE), legumes (WL), fruits (WFR), oils and fats (WOL), tobacco and betel (TBCW), prepared or manufactured food (WOPF) and spices and the miscellaneous (WSP). This method of grouping is not based on knowledge about elasticities among them as suggested by Hicks (1981), but rather based on our a priori knowledge about food needs and food habits on the areas of studies, and the reasons mentioned above.

1. The food groups covered in the study are assumed to represent total food consumption of the household. This may only be realistic assumption and therefore justified when they contributed to a major expenditure of respondent being studied.

5.1.2 Price of Commodity

Conventional practice of cross sectional demand analysis focuses its attention on behavioral change of consumers due to changing income level, household's demographical characteristics, and space-related demand determinants, like e.g. rural vs. urban. However, some studies have indicated, that also in cross section based analysis, estimating price elasticities is possible.

The major problem, when possibility of estimating elasticities from cross section data is proposed, concerns the degree of variation in price observed in this type of data set, and the reason why that variation exists. The question weather or if sufficient price variation exists to enable robust estimates of price elasticities to be made is actually empirical. So its justification is based on the actual conditions of the population under investigation.

In the literatures, there are arguments maintaining the existence of price variation at any point of time (cross sectional based variation): "That there is considerable spatial variation in prices in most developing countries should not be doubted" (Deaton, 1987).

1. Transport difficulties make it hard to bring the price in uniformity.

2. Price variation is there due to the fact that, as indicated by casual inspection, the price of a commodity depends on where it is purchased. Some observation revealed that the same good has different prices at different outlet in the market (Pratt et al, 1979);
3. Price variations reflect perceived or actual differences in quality, service agreements, location, or information imperfections;
4. Furthermore, price variation on commodities are caused by (i) the nature of firm's cost of production and weather they differ, (ii) the search strategy employed by consumers and weather search costs differ across consumers (iii) the nature of the demand for products;

Following assumptions meets the situation in East Java:

2 Price variation exists due to quality mix from one outlet to another at time of purchasing. This is still the case in East Java, both in urban and especially in rural areas: one *warung*[15] - a most generally found outlet in East Java - may serve the buyer differently. This difference creates a buying preference among potential buyers, therefore one buyer may be loyal to one outlet, whereas the other buyers be loyal to the other outlet;

3 Price variation is a reflection of quality effects, region, price discrimination, service purchased with the commodity, seasonal effects, quality differences;

4 Price variation reflects opportunity cost of time and marginal cost/benefit of information search;

5 Price variation may still exist as a reflection of cost of information, brand loyalty, brand loyalties through distribution network.

The inclusion of price in the demand function estimation with a cross-sectional survey data of household dated back on the works of Deaton (1978, 1988) and Cox and Wohlgenant (1986). Deaton maintained that household surveys contain information on the spatial distribution of prices, while Cox and Wohlgenant hold that knowledge of all factors affecting price differences and price variation induced by region and season is desirable from the standpoint of estimating commodity curves.

In this study, we assume that structure of demand is relatively constant, and consequently price variation can attributed to changes in supply condition. It is to say that a range of

[15] a traditional village-level outlet for foods and various consumer's goods.

prices for similar commodities can be generated, allowing estimation of cross -sectional demand functions. Corresponding works with this assumption are those of Timmer and Alderman (1979); Chernichovsky and Meesok (1982); Teklu and Johnson; Blundell et.al 1993).

The implied price of each good is calculated by dividing the total expenditure on each commodity by the total quantity of commodity ($P_i = \frac{E_i}{q_i}$). This is the definition of an implicit price. It does not necessarily reflect the marginal price that consumer face, but it is the only information available from the observation *indicating* the price.

5.1.3 Price of Grouped Commodity

The data we have are on value and quantity of consumed food items such as quantity and value of rice of type 1, quantity and value of mutton, number and value banana etc. The households noted both these quantities and expenditures value during the survey. Therefore, in the data we found for example, that a certain household for a certain period of time spent 20 000 *Rupiah* (Indonesian currency) for buying 10 kilograms of rice. Dividing the former by the latter which would be the unit value of rice could be used as an indicator that the price of rice is Rp. 2000, - per kilo. It is then straightforward to derive the own- and cross-price elasticities by running a regression of the quantity purchased on the unit value, total expenditure of food, and several other characteristics.

In this study, some of food items for reasons described in the previous section are grouped into any category. This handling creates the need of weighing price for each individual items being grouped. In this study, this is done by weighing each of them according to their share of consumption in their category. Likewise, the weighted price for each category is the sum of weighted prices of each item in that category. Hence for any particular group (k) consisting of n items, the price (P_k) is defined as

$$P_k = \sum_{i=1}^{n} P_i \frac{w_i}{\sum_{i=1}^{n} w_1}$$

where w_I is the share in the category or group being made.

5.2 The Problem of Missing Observation

Missing data of item's observation unit in each of household sample is *a matter of fact* in this study. Although this makes the data set incomplete, they can still be used in the analysis after some adjustment. There is a range of reference on this issue: Little and Rubin (1987) provides researcher with techniques to cope with data missing phenomena. Multivariate statistics Text of Tabacknick and Fidell (1996) address also problem of missing data and its associated solution. The same theme may also be found in Cohen and Cohen (1983). Various methods are there, to substitute missing data (e.g., by mean substitution, various types of interpolations and extrapolations). Also, parries deletion of missing data can be used.

5.2.1 The Problem of Zero Price

The problem of zero prices arises, when the information on unit value (price) is not available for all items and households. In any survey, the case of uninformed unit value (prices) occurs in two appearances: *first* when expenditure on a given food items are zero, *second*, in the case of so called „other categories of food" in which various food items with different measures are assorted as one category, that there is no unit value representing price of that category. At the other side, in order to estimates a complete demand system, the unit value (prices) must be available for all items, and for all households, regardless of whether or not a particular household consume that good. To take care of this problem, there is strategy proposed by Heien and Wessells (1988) and Heien and Pompelli (1988, 1989). This procedure was based on the estimation of the missing prices. The estimation of missing prices was done by performing a regression of observed prices on regional dummies and household total expenditures. The estimated prices replace the missing prices in the estimation of the demand system.

This study applied a strategy of mean substitution, in which the missing price data is substituted by an average value at *kabupaten* level. In this case, *kabupaten* represent a cluster of households with the same supply condition.

5.2.2 The Zero Expenditure Problem

The problem of zero expenditure rises when some households do not consume a certain food items or group of items being analyzed. An example mostly found in developing countries is low income group of households do not consume meat and milk, that their participation rates for meat and milks zero. Other typical example of zero expenditure phenomena is found in an economy where certain value in the community restrains the community to consume any food items. Typical for Indonesia for example is that Moslem families abstain from eating pig meats (De Vega and Fisher, 1983). In that phenomena we find that in the sample some households do not consume a certain food items or group of items being analyzed. It means that certain proportion of households in this income group have zero expenditures on these commodities.

Another possibility for the zero expenditure to exist in the collected data is due faulty records. There are two explanations for that. Firstly, zero purchases can result from false reporting by either respondent or enumerator. Secondly, the additional zeroes may arise because purchases are not made frequently. During a one week survey period many households record zero expenditure on many food items. An offsetting influence is occasional relatively large purchases, many of these presumably to be stored, for later consumption. Consumers who, prior to the survey, have made a recent purchase of infrequently purchased item, and concerned that the expenditure will escape enumeration, falsely record the purchase as having taken place during the survey period. However, in common the cause of the zero expenditure is not known. Also from the SUSENAS data, it was impossible to determine whether the household did not consume the particular products at all or simply did not consume during the one week period.

In general, the phenomena of zero expenditure recalls a specific method in the estimation process, because expenditure share of the commodity group to the total expenditures is a dependent variable in the estimation of demand system. Solutions for this phenomena are proposed by some authors. Cox and Wohlgenant (1986) applied a method to overcome missing prices, by discarding first all incomplete observations, and estimate population parameters using the remaining observations; and secondly, by using a zero order method which substitutes an appropriate sample mean for missing values.

Other more complex solution includes first order methods, where missing data is estimated in a more complex way and the missing value is viewed as unknown parameters The parameters are estimated by least squares on the completed sample, but the method by which the missing data are estimated has many variation (Amemiya (1984).

This study chooses to retain sample observations with zero expenditure or consumption levels being replaced by sample mean value at *Kabupaten* level. This is done, in order to portray adequately the full range of observed behavior. Because we maintain that price differences reflect mainly commodity supply conditions, then average prices methods are appropriate zero-order solutions for missing prices associated with these zero expenditures. Therefore, we use this procedure to determine missing prices. That way, we assume that the non-consuming households faced an average commodity price as maintained by Cox and Wohlgenant (1986).

5.3. Classification of Households in Income Groups

After the data is segregated into two area-based groups, the rural and the urban data, each of group is then further classified into three different income groups, by applying following procedures.

1. We arrange the data to get the range.
2. We determine class interval
3. We determine to have three income classes
4. Based on above requirements we split the data into three income classes: the lower income class, the middle, and the higher income class.

The following is an example from the rural area data set 1996.

- From the first step we got, that the range was 119 530
- For three class we got 119530 /3 = 39 000 (to be rounded). Based on this number, we used a width of approximately Rp. 40 000, - for each income class.
- Next step is then to place the household sample into one of these three income classes.
- The constructed expenditure groups are treated as a household income class, which is, assumed in this study to accommodate the household characteristics.

Applying this method we have three income groups with the following classification:

Income Group I < Rp. 45 000 per week

Income group II: Rp. 90 000 to < Rp. 130 000, - per week

Income Group III > Rp. 130 000 per week.

5.4. Modeling Demand System

5.4.1 Specification of System Model

One crucial step in empirical estimation process is to choose the working model. And for that, there are many criteria for selection of demand model to follow. But the important ones are: theoretical consistency, relative explanatory power of the model, simplicity and ease of estimation (Wang, Halbrend and Johnson, 1996). An examination of the literature reveals, that the class of complete demand systems, which both satisfy the theoretical constraints and admit non-linear Engel curves is very limited. Three of them are the Indirect Translog System of Christensen, Jorgenson and Lau (1975), generalized Linear Expenditure System of Carlevaro, and Quadratic Expenditure System of Pollak and Wales (1978 and 1980). The fourth type is the Almost Ideal Demand System (AIDS), a class of demand systems proposed by Deaton and Muellbauer (1980).

The following assumptions are made in specifying system models:

1. The functional form is identical for all commodities in the system.
2. The households operate in competitive food markets;
3. Food items constitute a weakly separable branch of the household's utility function which identical for all households. This is made to permits us to treat food consumption as if the household pre-allocates a particular budget to food before entering the markets and maximize its utility subject to this budget allocation. In that case, we apply the two-stage budgeting assumption (Thomas, 1987).

According to Deaton and Mullbauer (1980) the AIDS model has advantages in view of following characteristics.

1. It satisfies adding-up, homogeneity in price and income, and Slutsky symmetry;
2. Although highly non-linear in its parameters, it can be approximated into linear in parameters;
3. The model gives arbitrary first-order approximation to any demand system;
4. AIDS model satisfies the axioms of choice exactly;
5. It aggregates perfectly over consumers;

6. It has functional form consistent with household budget data;
7. It is simple to estimate (in its approximation linear form);

It may be used to test for homogeneity and symmetry constraints;

The choice of demand system in this study is based on (1) the agreement to theoretical constraints, (2) flexibility of functional form which is necessary for confronting them with the micro data used in this study.

The explanatory power of the AIDS models has been tested in both developed and developing countries context, that some author having research experiences of food demand studies in developing countries recommended the use of the AIDS model in studying demand in developing countries. Based on these advantages, this study applied the AIDS model to the existing data. Deaton and Muellbauer (1980) approximated the cost function of the price-independent generalized logarithmic (PIGLOG) class of preference, with the following cost function defined as a flexible functional form:

$$\text{Log } C\,(u, p) = (1 - u) \log \{a\,(p)\} + u \log \{b\,(p)\} \qquad \textbf{(5.1)}$$

where u is the utility level lying between zero and one, p is the price vector, and a(p) and b(p) are the cost of the subsistence and the bliss, respectively.

$$\log a\,(p) = \alpha_o + \sum_i \alpha_i \log p_i + \frac{1}{2}\sum_i \sum_j \gamma_{ij}^{*} \log p_i \log p_j \qquad \textbf{(5. 2)}$$

$$\text{Log } b\,(p) = \log a\,(p) + \prod_k P_i^{\beta k}\,, \qquad \textbf{(5. 3)}$$

where i and j indicate the i^{th} and j^{th} commodity (i and j = 1, 2, . . . n). Thus the AIDS cost function can be written as:

$$\text{Log } c\,(u, p) = \alpha_0 + \sum_i \alpha_i \log p_i + \frac{1}{2}\sum_i \sum_j \gamma_{ij}^{*} \log p_i \log p_j + \bar{U}\beta_0 \pi_i\, p_i^{\beta_i} \qquad \textbf{(5.4)}$$

where $\alpha_0, \alpha_i, \gamma_{ij}^{*}$ are parameters, $\bar{U}$ is utility level, and p_i are the prices of the i^{th} and the j^{th} commodities.

The AIDS model in budget share is obtained by firstly differentiating the cost function with respect to log price followed by substitution of $\bar{U}$ by using the cost function. The model specified bellow corresponds broadly to that of Blanciforti and Green (1987)[16]

[16] detailed derivations of the model are available in Deaton and Muellbauer (1980)

$$w_i = \alpha_i + \sum \gamma_{ij} \log P_j + \beta_i \log \frac{Y}{P} \quad \textbf{(5.5)}$$

where w is the budget share, P_j is price for j^{th} good and P is an overall price index defined in terms of individual prices as follows:

$$\log P = \alpha_0 + \alpha_j \log P_i + \frac{1}{2} \sum_i \sum \gamma_{ij} \log P_i \log P_j . \quad \textbf{(5.6)}$$

In this function the adding-up restriction implies:

$$\sum_i \alpha_i = 1, \quad \sum_i \beta_i = 0, \quad \sum_i \gamma_{ij} = 0 . \quad \textbf{(5.7)}$$

The equation system **(5.6)** with the adding up restriction **(5.7)** constitute the unrestricted system. For it to be consistent with utility theory, the following additional restrictions must hold:

1. homogeneity :

$$\sum_j \gamma_{ij} = 0, \text{ and}$$

2. symmetry :

$$\gamma_{ij} = \gamma_{ji} .$$

where $\alpha_i, \beta_i, \gamma_{ij}$ (i. j = 1,2, ..., n) are parameters.

When we use the Stone's (geometric) price index as *P*, then we can avoid the non-linear estimation (Deaton and Muellbauer (1980), and we get so called the linear Approximate AIDS (LA/AIDS) (see Blanciforti and Green, 1983).

So instead of using P we used P^*, defined as:

$$\text{Log}P \approx \log P^* = \alpha_0 + \sum w_k \log P_k \quad \textbf{(5. 8)}$$

5.4.2 Incorporating Income Group into the Linear AIDS

To consider the effect of household size in the system, the size variable is introduced in the model:

$$w_i = \alpha_i + \sum \gamma_{ij} \log P_j + \beta_i \log \left(\frac{Y}{P^*}\right) + \theta_i \log S \quad \textbf{(5. 9)}$$

or

$$w_i = \alpha_i + \beta_i (\log Y - \log P^*) + \sum_j \gamma_{ij} \log p_j + \theta_i \log S \quad \textbf{(5. 10)}$$

The reason for allowing household size into the model is because our data set covers households with widely different demographic characteristics. In this study however, only household size represents household characteristics. It is also worth noting, that concerning the household characteristics, effort has been made to find a scale by which different family members be assigned different scale according to age. This is what one call *equivalent scale* methods (see Pollak and Wales, 1981, 1992). Another notice that should be taken into account is the effects of individual factors (tastes, habits, expectations, experiences, and other unobservable variables). These may affect the consumption composition of the household. Technically speaking, if these variables are omitted from the model, their effects should be embedded into the disturbances assuming that their effects sum to zero. This is what we followed in this study. So, we let the household characteristics be indicated by one qualitative variable only that is the income group. Assuming this to be true, we let D to represent income group in the model, and therefore is embedded as dummy variable.

$$w_i = (\alpha_i + \delta_{ie}^i) + (\beta_i + \delta_{ie}^i)\log\left(\frac{Y}{P^*}\right) + \sum_j \gamma_{ij}\log p_j + \theta_i \log S \qquad \textbf{(5.11)}$$

The mathematical formulation of the linearized approximated AIDS equation is presented as follows:

$$WR = \alpha_{WR} + D_{1WR} + D_{2WR} + D_{3WR} + \gamma_1 lPr1_{WR} + \gamma_2 lPr2_{WR} + \gamma_3 lPr3_{WR} + \gamma_4 lPr4_{WR} + \gamma_5 lPr5_{WR} + \gamma_6 lPr6_{WR} + \gamma_7 lPr7_{WR} + \gamma_8 lPr8_{WR} + \gamma_9 lPr9_{WR} + \gamma_{10} lPr10_{WR} + \gamma_{11} lPr11_{WR} + \beta\, LYP_{WR} + \beta_1\, D1LYP_{WR} + \beta_2\, D2LYP_{WR} + \beta_3\, D3LYP_{WR} + \delta\, lJART_{WR} + e_{WR.}$$

$$WNR = \alpha_{WNR} + D_{1WNR} + D_{2WNR} + D_{3WNR} + \gamma_1 lPr1_{WNR} + \gamma_2 lPr2_{WNR} + \gamma_3 lPr3_{WNR} + \gamma_4 lPr4_{WNR} + \gamma_5 lPr5_{WNR} + \gamma_6 lPr6_{WNR} + \gamma_7 lPr7_{WNR} + \gamma_8 lPr8_{WNR} + \gamma_9 lPr9_{WNR} + \gamma_{10} lPr10_{WNR} + \gamma_{11} lPr11_{WNR} + \beta\, LYP_{WNR} + \beta_1\, D1LYP_{WNR} + \beta_2\, D2LYP_{WNR} + \beta_3\, D3LYP_{WNR} + \delta\, lJART_{WNR} + e_{WNR.}$$

$$WFS = \alpha_{WFS} + D_{1WFS} + D_{2WFS} + D_{3WFS} + \gamma_1 lPr1_{WFS} + \gamma_2 lPr2_{WFS} + \gamma_3 lPr3_{WFS} + \gamma_4 lPr4_{WM} + \gamma_5 lPr5_{WFS} + \gamma_6 lPr6_{WFS} + \gamma_7 lPr7_{WFS} + \gamma_8 lPr8_{WFS} + \gamma_9 lPr9_{WFS} + \gamma_{10} lPr10_{WFS} + \gamma_{11} lPr11_{WFS} + \beta\, LYP_{WFS} + \beta_1\, D_1LYP_{WFS} + \beta_2\, D_2LYP_{WFS} + \beta_3\, D_3LYP_{WFS} + \delta\, lJART_{WFS} + e_{WFS.}$$

$$WM = \alpha_{WM} + D_{1WM} + D_{2WM} + D_{3WM} + \gamma_1 lPr1_{WM} + \gamma_2 lPr2_{WNR} + \gamma_3 lPr3_{WNR} + \gamma_4 lPr4_{WNR} + \gamma_5 lPr5_{WNR} + \gamma_6 lPr6_{WNR} + \gamma_7 lPr7_{WNR} + \gamma_8 lPr8_{WNR} + \gamma_9 lPr9_{WNR} + \gamma_{10} lPr10_{WNR} + \gamma_{11} lPr11_{WNR} + \beta\, LYP_{WNR} + \beta_1\, D_1LYP_{WNR} + \beta_2\, D_2\, LYP_{WNR} + \beta_3\, D_3\, LYP_{WNR} + \delta\, lJART_{WNR} + e_{WM.}$$

$$WE = \alpha_{WE} + D_{1WE} + D_{2WE} + D_{3WE} + \gamma_1 lPr1_{WE} + \gamma_2 lPr2_{WE} + \gamma_3 lPr3_{WE} + \gamma_4 lPr4_{WE} + \gamma_5 lPr5_{WE} + \gamma_6 lPr6_{WE} + \gamma_7 lPr7_{WE} + \gamma_8 lPr8_{WE} + \gamma_9 lPr9_{WE} + \gamma_{10} lPr10_{WE} + \gamma_{11} lPr11_{WE} + \beta\, LYP_{WE} + \beta_1\, D1LYP_{WE} + \beta_2\, D_2\, LYP_{WE} + \beta_3\, D_3 LYP_{WE} + \delta\, lJART_{WE} + e_{WE.}$$

$$WL = \alpha_{WS} + D_{1WL} + D_{2WL} + D_{3WL} + \gamma_1 lPr1_{WL} + \gamma_2 lPr2_{WL} + \gamma_3 lPr3_{WL} + \gamma_4 lPr4_{WL} + \gamma_5 lPr5_{WL} + \gamma_6 lPr6_{WL} + \gamma_7 lPr7_{WFS} + \gamma_8 lPr8_{WFS} + \gamma_9 lPr9_{WFS} + \gamma_{10} lPr10_{WFS} + \gamma_{11} lPr11_{WFS} + \beta LYP_{WFS} + \beta_1 D_1 LYP_{WFS} + \beta_2 D_2 LYP_{WFS} + \beta_3 D_3 LYP_{WFS} + \delta lJART_{WFS} + e_{WL.}$$

$$WFR = \alpha_{WFR} + D_{1WFR} + D_{2WFR} + D_{3WFR} + \gamma_1 lPr1_{WFR} + \gamma_2 lPr2_{WFR} + \gamma_3 lPr3_{WFR} + \gamma_4 lPr4_{WFR} + \gamma_5 lPr5_{WFS} + \gamma_6 lPr6_{WFS} + \gamma_7 lPr7_{WFS} + \gamma_8 lPr8_{WFS} + \gamma_9 lPr9_{WFS} + \gamma_{10} lPr10_{WFS} + \gamma_{11} lPr11_{WFS} + \beta LYP_{WFS} + \beta_1 D_1 LYP_{WFS} + \beta_2 D_2 LYP_{WFS} + \beta_3 D_3 LYP_{WFS} + \delta lJART_{WFS} + e_{WFS.}$$

$$WOL = \alpha_{WOL} + D_{1WOL} + D_{2WOL} + D_{3WOL} + \gamma_1 lPr1_{WOL} + \gamma_2 lPr2_{WOL} + \gamma_3 lPr3_{WOL} + \gamma_4 lPr4_{WOL} + \gamma_5 lPr5_{WOL} + \gamma_6 lPr6_{WOL} + \gamma_7 lPr7_{WOL} + \gamma_8 lPr8_{WOL} + \gamma_9 lPr9_{WOL} + \gamma_{10} lPr10_{WOL} + \gamma_{11} lPr11_{WOL} + \beta LYP_{WOL} + \beta_1 D_1 LYP_{WOL} + \beta_2 D_2 LYP_{WOL} + \beta_3 D_3 LYP_{WOL} + \delta lJART_{WOL} + e_{WOL}$$

$$WTB = \alpha_{WTB} + D_{1WTB} + D_{2WTB} + D_{3WTB} + \gamma_1 lPr1_{WTB} + \gamma_2 lPr2_{WTB} + \gamma_3 lPr3_{WTB} + \gamma_4 lPr4_{WTB} + \gamma_5 lPr5_{WTB} + \gamma_6 lPr6_{WTB} + \gamma_7 lPr7_{WTB} + \gamma_8 lPr8_{WTB} + \gamma_9 lPr9_{WTB} + \gamma_{10} lPr10_{WTB} + \gamma_{11} lPr11_{WTB} + \beta LYP_{WTB} + \beta_1 D_1 LYP_{WTB} + \beta_2 D_2 LYP_{WTB} + \beta_3 D_3 LYP_{WTB} + \delta lJART_{WTB} + e_{WTB.}$$

$$WOPF = \alpha_{WOPF} + D_{1WOPF} + D_{2WOPF} + D_{3WOPF} + \gamma_1 lPr1_{WOPF} + \gamma_2 lPr2_{WOPF} + \gamma_3 lPr3_{WOPF} + \gamma_4 lPr4_{WOPF} + \gamma_5 lPr5_{WOPF} + \gamma_6 lPr6_{WOpf} + \gamma_7 lPr7_{WOPF} + \gamma_8 lPr8_{WOPF} + \gamma_9 lPr9_{WOPF} + \gamma_{10} lPr10_{WOPF} + \gamma_{11} lPr11_{WOPF} + \beta LYP_{WOPF} + \beta_1 D_1 LYP_{WOPF} + \beta_2 D_2 LYP_{WOPF} + \beta_3 D_3 LYP_{WOPF} + \delta lJART_{WOPF} + e_{WOPF.}$$

$$WSP = \alpha_{WSP} + D_{1WSP} + D_{2WSP} + D_{3WSP} + \gamma_1 lPr1_{WSP} + \gamma_2 lPr2_{WSP} + \gamma_3 lPr3_{WSP} + \gamma_4 lPr4_{WSP} + \gamma_5 lPr5_{WSP} + \gamma_6 lPr6_{WSP} + \gamma_7 lPr7_{WSP} + \gamma_8 lPr8_{WSP} + \gamma_9 lPr9_{WSP} + \gamma_{10} lPr10_{WSP} + \gamma_{11} lPr11_{WSP} + \beta LYP_{WSP} + \beta_1 D_1 LYP_{WSP} + \beta_2 D_2 LYP_{WSP} + \beta_3 D_3 LYP_{WSP} + \delta lJART_{WSP} + e_{WSP.}$$

Table 5.1: Variable Description and A-priory Hypotheses

CODE	VARIABLE NAME	VARIABLE DESCRIPTION/ COMPOSING FOOD ITEMS
WR	rice groups	Domestic rice, imported rice, sticky rice.
WNR	Non-rice staple	Corn, cassava, sweet potatoes, talas, Sago
WFS	Fish group	Sea and fresh water fishes, shrimps, squids; crabs: fresh, preserved, canned.
WM	Meat group	Beef, buffalo Beef, Mutton, Pork, Chicken
WE	Eggs and Milk	Eggs, Milk and milk products
WL	Legumes/Nuts	Peanut, Soya Beans, Mung Bean Cashew Nut, Soya cakes (Tempe), Tofu
WFR	Fruits and Vegetables	vegetables, and fruits: fresh and preserved, canned
WOL	Edible Oil and Fat	Cooking oils, margarine, coconuts
WTB	Tobacco and Betel	Clove filtered cigarettes, unfiltered cigarettes, cigarettes, tobaccos, betel, cigars
WOPF	Prepared Foods	Bottled water (carbonated, non-carbonated), alcoholic beverages, energy enriched beverages, packed cakes & foods, syrups, breads, instant noodles, packed served foods (fried chicken, fried rice, sate salads), snacks, ice cream.
WSP	Spices, Miscellaneous	Salts, candle nut, coriander, pepper, nutmeg, cloves, fish paste, Soya sauce, tomato sauce, packed-and mixed spices, crispy, Getup chips, macaroni. Etc.

D_j	Income Group Dummy, J=1,2,3	1 : lower group; 2: middle group; 3: higher group
LPr_{ij}	Log of Price of Food Group I, j = 1- 11;	Prices (unit values) of the estimated food groups
LYP_i	Log of Total Food Expenditure	
LJART	Log of Household Size	
β_1	Expenditure Parameter	Total expenditure
α	Parameter	Intercept coefficient
γ	Price Parameters	Price coefficients
$\beta_i D_i$	Income group Parameters	Coefficients of the lower, middle, and higher income groups
δ	Parameter	Coefficient of household size
e	Disturbance parameter	

5.5 Estimation Procedures

The LA/AIDS incorporating household size of equation **(5.13)** will be the empirical version to be estimated. For empirical implementation, any demand system model must be embedded in a stochastic framework. A disturbance term for each equation in the system is required since some factors not implicitly introduced into the model may influence household consumption behavior. The stochastic assumption are that $E(e_i) = 0$ and $E(e_i e_{i+1}) = \delta_{ii+1}\Omega$. Where e_i is an n x 1 vector and δ_{ii+1} the Kronecker product. It means that error term is assumed to have expectation zero, to be uncorrected across commodities and have a contemporaneous variance-covariance matrix Ω. Due to the adding up conditions (the sum of budget shares equals one) the variance-covariance matrix of the disturbance term is singular. Each disturbance term can be written as a linear combination of the remaining disturbance terms. The singularity of variance-covariance matrix Ω prohibits the estimation of the demand function by system approaches. To overcome this singularity, it is necessary to delete arbitrarily one commodity from the full set.

To estimate the LA/AIDS while imposing both homogeneity and symmetry, Zellner's Iterative Seemingly Unrelated Regression Estimation (ITSURE) will be used. The seemingly unrelated regressions methods may improve the efficiency of parameters estimates when there is contemporaneous correlation of errors across equations (Zellner,

1962). This permits cross-equation restrictions to be imposed and with the iterative solutions estimates are independent of the deleted equation (Barten, 1969).

In this study, the equation for the last commodity (other) will be dropped in order to form the joint density function. The computer program available for estimating of equations in SAS (Statistical Analytical System) program is called ITSUR (iterative seemingly unrelated regression or iterative joint-generalized least square). This program obtained the contemporaneous correlation matrix by using OLS residual and the final parameter estimates take this information into account.

5.6. Computation of Elasticities of Demand

The elasticities of particular interest are own and cross price, expenditure, and household size elasticities of expenditure. The main advantage of the use of elasticities is that these are independent of the units measurements, thus results are comparable even if derived for countries with different currencies or where the commodities are measured in different physical units. The formulae and procedure used for calculation of elasticities and related statistics of the AIDS model in this study followed Teklu and Jonhson (1988), and Green and Alston (1990).

Expenditure elasticities

$$\varepsilon_{iy} = \frac{\beta_i + \beta_i^{'}}{w_i} + 1 \qquad \textbf{(5.12)}$$

Own price elasticities

$$\varepsilon_{ii} = \frac{\gamma_{ii} - (\beta_i + \beta_i^{'})\, w_i}{w_i} - 1 \qquad \textbf{(5.13)}$$

Cross price elasticities

$$\varepsilon_{ij} = \frac{\gamma_{ij} (\beta_i + \beta_i^{'})\, w_j}{w_i} \qquad \textbf{(5.14)}$$

Household Size: $$\varepsilon_{is} = \frac{\theta_i - (\beta_i + \beta_i^{'})}{w_i} \quad \textbf{(5.15)}$$

The compensated or hicksian price elasticities are derived by transforming the ordinary or marshallian price elasticities through the Slutsky equation. Thus, the compensated own price elasticities becomes

$$\varepsilon_{ii}^{H} = \varepsilon_{ii} \quad + \quad w_i \,.\, \varepsilon_{iy} \quad \textbf{(5.16)}$$

and the compensated cross price elasticities becomes

$$\varepsilon_{ij}^{H} = \varepsilon_{ij} \quad + \quad w_j \,.\, \varepsilon_{iy} \;, \quad \textbf{(5.17)}$$

where ε_{ii}^{H} and ε_{ij}^{H} are the compensated own price and cross price elasticities respectively, the rests are defined as previously.

The price and household size elasticities for the standard model, i.e. equation **(5.11)** without income group variables, can be obtained by imposing $\beta_i^1 = 0$ in equation **(12)** to **(17)** respectively. The elasticities will be calculated at the mean sample, assuming the mean budget share fixed. The standard errors of the elasticities will be calculated using the usual formulas for the distribution of linear transformation of a normally distributed random vector. Equations (5.13) to (5.17) can be rewritten in matrix form as:

$$\boldsymbol{\varepsilon} = \mathbf{Ab} \quad \textbf{(5.18)}$$

where $\boldsymbol{\varepsilon}$ is the vector of estimated elasticities ($\varepsilon_{iy}, \varepsilon_{ii}, \varepsilon_{ij}, \varepsilon_{is}$), b is the vector of estimated AIDS model parameters ($\gamma's, \beta's, \text{and } \theta$) and **A** is a matrix. The variance covariance of $\boldsymbol{\varepsilon}$, Var($\boldsymbol{\varepsilon}$) is

$$\text{Var}(\boldsymbol{\varepsilon}) = \mathbf{A}\text{Var}(\mathbf{b})c\,\mathbf{A}^{\text{T}} \quad \textbf{(5.19)}$$

where Var (**b**) is the variance-covariance matrix of **b**.

The values of all elasticities used in this study therefore are not independent of the distribution of the budget share. Unlike the LES model, the AIDS model allows the expenditure elasticity to decrease with respect to a decrease in the budget shares for the necessities ($\beta_i < 0$). Expressed mathematically this is to say

$$\frac{\partial \varepsilon_{iy}}{\partial w_i} = -\frac{\beta_i}{w_i^2} > 0 \text{ for } \beta_i < 0 \quad \textbf{(5.20)}$$

Thus, in this situation, the AIDS model possesses a more desirable property than the LES. Concerning the properties of the own-price elasticities in the AIDS, the sign of $\partial \varepsilon_{ii} / \partial w_i$ depends on the relative magnitudes of γ_{ii} and $\beta_i w_i$. A priori, it is difficult to assign a positive or negative value to change in ε_{ii} with respect to a change in the budget share, w_i (Blanciforti and Green, 1983).

The method selected for calculation of elasticities for the AIDS model is important if reliable results are to be expected. In the test of alternative formulae for the calculation of the elasticities of demand in the AIDS models used by analysts, Green and Alston (1990) concluded that not all were reliable and correct. According to Green and Alston, the elasticity estimates for any commodity are similar across the AIDS model and the linear approximation of the AIDS model using formulae (5.13) to (5.17). Green and Alston recommended these estimators as the ones, which provide similar elasticities to the AIDS model.

5.7 Tests of Restrictions

Test of restriction embodies our study and concerns to answer the questions of the reliability model assumptions. One advantage of using AIDS model is that it gives the researcher possibility to impose and test the validity of underlying consumer theory in economics. The main interest in the inference with regard to the estimation of demand system is the question if the underlying theory is supported by the existing data. As explained previously, symmetry, adding-up and homogeneity are restrictions that can be tested and imposed in the AIDS model. For that purpose test is conducted using the likelihood ratio test. The test statistic *Likelihood Ratio* (denoted byλ) is the ratio of the maximum value of two likelihood ratios under the more restrictive hypothesis (Lω) to that of a less restrictive hypothesis (LΩ). Symbolically, if (Lω) and (LΩ) are the maximum values of the likelihood function with and without a set of specified restrictions respectively, the likelihood ratio is defined as:

$$\lambda = \frac{L\omega}{L\Omega}.$$

For the Null Hypothesis of the form

$$H_0: \mathbf{R}\beta = \mathbf{r},$$

as in the case of this study, where **R** is a *(J x K)* matrix that selects the appropriate elements from β so as to specify the linear combinations of β that are of interest; **r** is a (*J* x 1) vector of value to which we hypothesize that the linear combinations are equal, with normally distributed error; It can be shown that the λ may be simplified into: λ_{LR} = T (in SSE_R - lnSSE_U)

In other words, the likelihood ratio test statistic can be written in terms of the restricted and unrestricted sums of square errors and have a χ^2 distribution with J (number of restriction) degree of freedom. (see for instance Griffiths *et al*, 1993). For normally distributed disturbance,

$$\lambda = \left(\frac{\left| \hat{\Sigma}_{\omega} \right|}{\left| \hat{\Sigma}_{\Omega} \right|} \right)^{-T/2},$$

or

$$-2 \text{ Log } \lambda = T \left(\text{ Log } \left| \hat{\Sigma}_{\omega} \right| - \text{ Log } \left| \hat{\Sigma}_{\Omega} \right| \right).$$

Under the null Hypothesis that the restriction valid, the less restricted LΩ is distributed, asymptotically as a chi square distribution with degree of freedom equal to the number of restrictions to be tested.

Decision Procedure

To test the restrictions the following procedure is applied:

1. We calculate the determinant of variance covariance matrix of the residual of the model with and without restrictions. When using ITSUR of SAS program, this estimate, terms as S matrix, provided as part of estimation result given out by the program.
2. We form the ratio the lambda, which is (λ) = L_0/L_1. This ratio is always between 0 and 1 and the less likely the assumption is, the smaller λ will be. This can be quantified at a given confidence level as follows:
3. We calculate the Chi-square, which χ^2 = -2 ln. The smaller is, the larger χ^2 will be.
4. We can tell when χ^2 is significantly large by comparing it to the upper 100 × (1- α) percentile point of a Chi Square distribution with k degrees of freedom. χ^2 has an approximate Chi-Square distribution with k degrees of freedom as defined previously

5. The likelihood ratio tests computes χ^2; and rejects the assumption, if χ^2 is larger than a chi square with k degrees of freedom percentile, where the percentile corresponds to the confidence level chosen by the analyst.

5.8 Welfare Analysis

As explained previously, three methods are available for the measurement of welfare change. They are the consumer surplus (CS) concept, the compensating variation (CV) comcept, and the equivalent variation (EV) concept. Technically, consumer surplus is relevant to our analysis; if we were secured that income effect of price change is zero. Since we know, that this is not the case (compensated and ordinary price elasticities are not the same), we use rather welfare measure based on Hicksian demand function. Between CV and EV, CV is preferable, because it allows us to make an *ex – ante* analysis of welfare change. To measure changing household's welfare from a changing policy, welfare must be measurable. However, utility which indicates welfare is not directly measurable. So an alternative measure must be chosen. The CV measure is based on new prices, and the EV measure is based on initial prices. Information on the distribution of welfare gains and losses among household groups should be useful to policymakers in making judgments on whether this policy result is inferior or superior to an alternative policy result. Since we refer to the new price in our analysis, Compensating Variation was used in this study.

- ***Compensating Variation***

To find money metric expression for this measure from the observable data, one who follows the path of analysis should be going from the demand function back to the underlying cost function.

Since the Hicksian demand functions are the derivatives of the cost function, integration also gives the differences in costs of reaching the same level of well-being from two different price situations. And so

$$CV = \int_{p_1}^{p_0} \sum_i x_i(p, u^0)\, \mathrm{d}\, p_i x + \nabla m \qquad \textbf{(5.21)}$$

- ***Compensating Variation Measurement of Proposed Price Change***

The general expression of **(5.14)** is

$$CV_i = C(u_i^0, p_i^1 - u_i^0, p_i^0) \qquad \textbf{(5.22)}$$

where: $\boldsymbol{C}V_i$ = compensating variation of a price change for the i^{th} income group

$\mathrm{u}_{\mathrm{i}0}$ = original utility level for the i^{th} income group

p_i^0 = original mean price vector for the i^{th} income group

$\mathrm{p}_{\mathrm{i}}^1$ = new mean price vector for the i^{th} income group.

Both vector of prices are observable (the original vector of prices is the observed data, and the new vector of prices is set exogenously) but utility levels are not.

As can be seen, the expression for CV contains the utility level u which not observable. In order to estimate the CV's by income groups, we need to transform the utility function into money metric indirect utility function m (P, V), namely, the income (expenditure) needed to attain utility level v at the vector of prices P. This expresses consumer's willingness to pay to attain the said utility level.

The calculation of an observable utility level may be done by employing the indirect utility function. This is conducted by transforming the expenditure or underlying cost function for the AIDS:

$$\ln c(p,u) = a(p) + u \times b(p) \Leftrightarrow u(p,Y) = \frac{\ln m - a(p)}{b(p)}. \qquad \textbf{(5.23)}$$

Expressed in detail, it becomes

$$U_o\, V(p, m) = \frac{\left\{\ln m - (\alpha_0 + \sum_{j=1}^{11} \alpha_j \ln P_j + \frac{1}{2} \sum_{j=1}^{11} \sum_{k=1}^{11} \gamma_{jk} \ln P_j \ln P_k)\right\}}{\left\{\beta_0 \prod (p_k)^{\beta k}\right\}} \qquad \textbf{(5.24)}$$

where $\mathrm{m}_{\mathrm{i}}^0 =$ mean of original income for the i^{th} income group and

$$\ln m = \alpha_0 + \sum_{i=1}^{11} \ln P_j + \tfrac{1}{2} \sum_{j=1}^{11} \sum_{k=1}^{11} \gamma_{jk} \ln P_j \ln P_k + U \prod P_{\mathrm{j}}^{\beta \mathrm{i}} \qquad \textbf{(5.25)}$$

In the optimum condition, it holds that c = m

To do so,

$$m_i^0 = c(u_i^0, p_i^0) \quad \textbf{(5.26).}$$

Equation **(5.24)** can be used to estimate the money metric value of u at starting and end points of any economic change.

For the CV's calculation, we can use the estimated results of equation **(5.11),** namely α_i, γ_{ij}, and β_i.

Finally, the CV's for each income group are found by subtracting the value of the original cost functions (m_i^{0}'s) from the value of the new cost functions (found by replacing the new vector of prices and the original utility levels U_i^0 in equation **(5.24).**

CHAPTER 6
ESTIMATION RESULTS AND DISCUSSION

This chapter presents the results of estimation we made on the linearized AIDS Model applied on data bodies we have. The model describes the consumption behavior of Households in rural and urban - East Java recorded in four rounds of the SUSENAS-survey. The estimation is conducted using the SAS program version 6.12. The estimation applied the iterative seemingly unrelated regression (ITSUR) procedure. This procedure allows the estimation of eventually contemporaneous correlation in error terms across equations, which then to be used to derive more efficient estimates.

A descriptive statistics, in terms of mean of budget share of each food groups to the total food expenditure was derived as a part of the estimation's results. They are presented in the first section, as a prelude for the assessments to follow. Its importance lies in giving an idea on the dominance of each group relative to the other. The mean values presented in Table 6.1 were used to estimate the point elasticities.

6.1 The Budget Share

Table 1 presents the average budget share of each food groups across survey rounds and areas. This information is important to give an idea on the composition and relative significance of each food groups to total household's expenditure on food.

Information on food share is an important element in assessment of the results for policy designing.

A quick glance at the share numbers given in Table 6.1 shows that rice assumed the most important role followed by prepared foods and tobacco and betel, while the rest of food groups shares a fairly balanced portion to the total household's food expenditure. With respect of area, rice took a bigger portion of household's food expenditure in rural than in urban areas. This share declined only slightly in the course of surveys. It means that irrespective of time and space, rice constitutes a main menu for households in East Java, Indonesia.

Table 6.1 Shares of Food Groups (mean value) to Weekly Total Food Expenditure, East Java, Indonesia

FOOD GROUPS	1990		1993		1996		1999	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Rice	0.28	0.29	0.21	0.26	0.22	0.27	0.21	0.25
Non Rice Staple	0.03	0.09	0.02	0.06	0.02	0.06	0.02	0.07
Fish	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05
Meat	0.06	0.09	0.09	0.08	0.08	0.08	0.07	0.08
Eggs and Milk	0.08	0.04	0.07	0.05	0.06	0.04	0.05	0.04
Legume	0.06	0.05	0.06	0.06	0.06	0.05	0.06	0.05
Fruit & vegetable	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.04
Edible Oil	0.05	0.05	0.05	0.06	0.05	0.06	0.05	0.06
Tobacco & betel	0.10	0.08	0.11	0.10	0.12	0.10	0.11	0.09
Prepared Foods	0.21	0.17	0.26	0.20	0.27	0.22	0.31	0.24
Spices	0.04	0.04	0.03	0.04	0.02	0.03	0.02	0.03

Sources: own calculation, from the SUSENAS, 1990, 1993, 1996, 1999

With respect to the share of prepared food, its relative importance may be attributed to its many items that composed it. Prepared food is a mix of all food goods that households did not prepared by themselves. It includes mainly bottled or packaged drinks and snacks in various forms, mostly offered to households in line with increasing numbers of food manufacturing industries. The inclusion of these items into one composite in this study is made, to capture the consumption attitude of households towards manufactured foods. It may be interpreted as their willingness to "diversify" their daily menu into more various brackets. Food diversification strategy gains an increasing attention from policy makers in Indonesia, due to an increasing concern of rice scarcity in the country.

A close inspection into the share's number in the table shows us a consistently increasing portion of prepared foods to the total household's budget for food in the course of the surveys. It holds for both rural and urban areas. Too, the portion of household's budget disposed to prepared foods is bigger in urban areas than in rural areas.

Tobacco and betel in this study represent convenience goods which take an important role in household budget. Table 6.1 shows that Tobacco and betel ranked the third in term of

household's budget share. The fact that the budget share of tobacco and betel assumes relatively high amount in both areas indicated the importance of *local specific convenience goods* in the household's pending pattern.

A combined picture of a slightly declining rice share and increasing share of prepared foods is consistent to the expectation. It is also desirable in perspective of food diversification is perceived.

However, the consumption pattern of households in East Java still follows a typical pattern of consumption in Indonesia in general, in which rice constitutes a single main food groups to the total household food budget. It implies that food policy should be still focused on rice as a main agenda. Rice policy thus, remains an important and crucial agenda of this sector, for political and economic reasons.

6.2 The Model's Performance

The demand system that we specified consists of budget share to the total food expenditure of the following food groups: rice, non-rice staples, fish, meat, eggs and milk, legumes, Fruits and Vegetables, Edible Oils, tobacco and betel, prepared food , and spices and miscellaneous.

Demand estimates for spices and miscellaneous food group are not estimated directly, because it was dropped from the system. Instead, they were estimated by using adding up principle. These eleven food groups accommodated all items recorded in the questionnaire of SUSENAS module for household expenditure survey. It is worth noting, that the group of prepared foods into this group is motivated by the expectation that this group may represent the consumer's preference on processed foods that possibly be substitutive for rice. This type of information is needed to address issues of food diversity for rice. When prepared food is substitute for rice, and has more than unity elasticity of income, then it seems to be reasonable to hypothesize that the promotion of processing food industry might be means to cut the dependence of people on rice. Tables 6.2 to 6.9 display the parameter estimates resulted from the model estimation. The estimation was done with the imposition of homogeneity and symmetry restrictions. The adding-up restriction is automatically imposed.

Table 6.2 Parameter Estimates for the LA/AIDS Model Based on the 1990 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			COMMODITY PRICES		
		Lower	Middle	Higher	Rice	N.Rice.S	Fish
Rice	0.43617***	0.13790**	-0.10532	-0.03258	0.09962***	-0.00793**	-0.01435***
Non Rice Staple	-0.03085	0.01261	-0.04879	0.03618	-0.00793**	0.00947***	-0.00192**
Fish	0.10379***	-0.03910	0.04389	-0.00479	-0.01435***	-0.00192**	0.01673***
Meat	0.17200***	-0.12176**	0.10025	0.02151	-0.00661	0.00078	0.00126
Eggs and Milk	0.11893***	-0.06385	0.20018	-0.13633***	0.00369	0.00392***	0.00027
Legume	0.11005***	-0.04797	0.18887	-0.14090***	-0.00575	0.00050	-0.00219
Fruit & Vegetable	-0.04509	0.00903	-0.01951	0.01048	-0.01720***	-0.00281*	0.00357***
Edible Oil	0.09978***	-0.02950	0.07468	-0.04518**	0.01809***	0.00071	-0.00128*
Tobacco	0.05767	-0.02161	-0.09180	0.11341*	-0.03402***	-0.00238	-0.00151
Prepared Foods	-0.00978	0.14303**	-0.27308	0.13005**	-0.03082***	-0.00062	-0.00294**
Spices [c]	-0.01267	0.02122	-0.06937	0.04815	-0.00472	0.00028	0.00236

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	-0.00661	0.00369	-0.00575	-0.01720***	0.01809***	-0.03402***
Non Rice Staple	0.00078	0.00392***	0.00050	-0.00281**	0.00071**	-0.00238
Fish	0.00126	0.00027	-0.00219	0.00357***	-0.00128*	-0.00151
Meat	0.01404***	-0.00297*	0.00498	0.00400	-0.00498**	0.00552
Eggs and Milk	-0.00297*	-0.00499***	0.00037	-0.00407***	0.00089	0.00361*
Legume	0.00498	0.00037	0.01557***	0.00116	0.00060	-0.01272***
Fruit & Vegetable	0.00400	-0.00407***	0.00116	0.01735***	-0.00564^***	0.00371
Edible Oil	-0.00498**	0.00089	0.00060	-0.00564***	-0.00507***	0.00026
Tobacco	0.00552	0.00361*	-0.01272***	0.00371	0.00026	0.03555***
Prepared Food	-0.01391***	-0.00193	-0.00366**	-0.00188	-0.00291***	-0.00058
Spices [c]	-0.00210	0.00119	0.00114	0.00182	-0.00068	0.00255

MODEL	COMMODITY PRICES		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle	Higher	
Rice	-0.03082***	-0.00472**	-0.12972***	-0.03731*	0.03561	0.00169	0.17013***
Non Rice Staple	-0.00062	0.00028	0.01845***	-0.00036	0.01386	-0.01350	0.00186
Fish	-0.00294**	0.00235***	-0.01826**	0.01113	-0.01460	0.00347	0.00356
Meat	-0.01391***	-0.00210*	-0.03429***	0.03257***	-0.03615	0.00358	-0.01343***
Eggs and Milk	-0.00193	0.00119*	-0.00986	0.01588	-0.05472	0.03884***	-0.01556***
Legumes	-0.00366**	0.00114	-0.01593*	0.01038	-0.04685	0.03648	-0.00544
Fruit & Vegetable	-0.00188	0.00182*	0.03572***	-0.00537	0.00694	-0.00157	-0.02746***
Edible Oil	-0.00291***	-0.00067	-0.01338***	0.00895	-0.02050	0.01154*	-0.00021
Tobacco	-0.00058	0.00255*	0.02912**	0.00399	0.02482	-0.02881	-0.03601***
Prepared Foods	0.06152***	-0.00226***	0.11961***	-0.03520**	0.07227	-0.03707***	-0.06646***
Spices [c]	-0.00226	0.00043	0.01854	-0.00467	0.01931	-0.01464	-0.01098

Note:*:p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.3 Parameter Estimates for the LA/AIDS Model Based on the 1990 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.82731***	-0.22646***	0.54562	-0.31916***	0.06853***	-0.01220***	-0.01132***
Non Rice Staple	-0.35235***	0.31185***	-0.57096	0.25911***	-0.01220***	0.02004***	-0.00197
Fish	-0.03556***	0.04994***	-0.11649	0.06655***	-0.01132***	-0.00197***	0.01742***
Meat	0.21759***	-0.12273***	0.14292	-0.02019	0.00338	0.00006	-0.00442***
Eggs and Milk	0.07959***	-0.02084*	0.02881	-0.00797	-0.00904***	0.00176***	-0.00036
Legume	0.09160***	-0.05213***	0.07103	-0.01890	0.00027	-0.00173**	-0.00145***
Fruit & Vegetable	-0.00591	-0.05147***	0.05091	0.00056	-0.00210	-0.00610***	0.00299***
Edible Oil	0.06991***	0.01874	-0.02778	0.00904	0.01701***	0.00053	-0.00017
Tobacco	0.06124***	-0.04802**	0.00327	0.04475**	-0.01610***	-0.00152**	0.00225***
Prepared Foods	0.06600***	0.11356***	-0.05987	-0.05369**	-0.03801***	0.00114	-0.00546***
Spices [c]	-0.01942	0.02756	-0.06746	0.03990	-0.00041	-0.00001	0.00248

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	0.00338	-0.00904***	0.00026***	-0.00210	0.01701***	-0.01610***
Non Rice Staple	0.00006***	0.00176***	-0.00173**	-0.00610***	0.00053	-0.00152*
Fish	-0.00442***	-0.00036	-0.00145***	0.00299***	-0.00017	0.00225***
Meat	0.00460**	0.00143***	0.00547***	0.00024	-0.00526***	0.00169
Eggs and Milk	0.00143***	0.00249***	0.00292***	-0.00043	0.00131***	0.00038
Legume	0.00547***	0.00292***	0.00475***	-0.00147	-0.00138*	-0.00481***
Fruit & Vegetable	0.0002	-0.00043	-0.00147	0.01073***	-0.00332***	0.00125
Edible Oil	-0.00526***	0.00131***	-0.00138*	-0.00332***	-0.00795***	0.00206***
Tobacco	0.00169	0.00038	-0.00481***	0.00125	0.00206***	0.01893***
Prepared Food	-0.00536***	-0.00056	-0.00404***	-0.00223***	-0.00261***	-0.00276***
Spices [c]	-0.00183	0.00011	0.00146	0.00045	-0.00021	-0.00136

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle	Higher	
Rice	-0.03801***	-0.00041	-0.22686***	0.05454***	-0.15401	0.09948***	0.10296***
Non Rice Staple	0.00114	-0.00001	0.12192*	-0.07672***	0.16518	-0.08846***	0.03111***
Fish	-0.00546***	0.00248***	0.03234***	-0.01303***	0.03217	-0.01914***	-0.00949***
Meat	-0.00536***	-0.00183***	-0.04674***	0.03439***	-0.04449	0.01011**	0.00368***
Eggs and Milk	-0.00056	0.00011	-0.00999***	0.00529	-0.00923	0.00394	-0.00493***
Legumes	-0.00404***	0.00146***	-0.01373***	0.01201**	-0.01953	0.00752	-0.01003***
Fruit & Vegetable	-0.00223***	0.00045	0.01898***	0.01532***	-0.01705	0.00173	-0.02035***
Edible Oil	-0.00261***	-0.00021	-0.00133	-0.00535*	0.00840	-0.00305	-0.00503***
Tobacco	-0.00276***	-0.00136***	0.01722***	0.01240**	-0.00320	-0.00920	-0.03090***
Prepared Foods	0.06120***	-0.00133***	0.08533***	-0.03201*	0.02185	0.01016*	-0.04397***
Spices [c]	-0.00132	0.00067	0.02286	-0.00684	0.01992	-0.01308	-0.01305

Note: *: p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.4 Parameter Estimates for the LA/AIDS Model Based on the SUSENAS Micro Data: 1993, Urban East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.37317***	0.08145***	-0.04648	-0.03496	0.10559***	-0.00395***	-0.01430***
Non Rice Staple	0.01471***	0.00132	-0.01228	0.01096	-0.00395***	0.00335***	-0.00039
Fish	0.07548***	-0.01378	-0.01647	0.03025**	-0.01430***	-0.00039	0.01919***
Meat	0.16219***	-0.04560***	0.04161	0.00399	-0.00423	0.00210***	0.00250***
Eggs and Milk	0.05588***	-0.01792	0.05660	-0.03868*	-0.00999***	-0.00010	0.00027
Legume	0.10210***	-0.01140	0.03598	-0.02458*	0.00079	0.00006	-0.00236***
Fruit & Vegetable	0.02516***	-0.03800***	0.02264	0.01536	-0.01400***	-0.00016	0.00408***
Edible Oil	0.08358***	0.01145	-0.01144	-0.00001	0.00297	0.00064	-0.00282***
Tobacco	0.04514***	-0.04929**	-0.04225	0.09154***	-0.02425***	-0.00126	0.00041
Prepared Foods	0.02703***	0.05927**	0.01051	-0.06978**	-0.03772***	-0.00090**	-0.00666***
Spices [c]	0.03556	0.02251	-0.03841	0.01590	-0.00091	0.00060	0.00008

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	-0.00423	-0.00999***	0.00079	-0.01400***	0.00297	-0.02425***
Non Rice Staple	0.00210***	-0.00010	0.00006	-0.00016	0.00064	-0.00126
Fish	0.00250***	0.00027	-0.00236***	0.00408***	-0.00282***	0.00041
Meat	0.01848***	0.00145	-0.00114	-0.00138	-0.00312***	-0.00677***
Eggs and Milk	0.00145	0.00455***	0.00280***	0.00026	0.00170***	0.00251**
Legume	-0.00114	0.00280***	0.00752***	-0.00219*	0.00376***	-0.00741***
Fruit & Vegetable	-0.00138	0.00026	-0.00219**	0.02003***	-0.00182**	-0.00220
Edible Oil	-0.00312***	0.00170***	0.00376***	-0.00182**	0.00323***	-0.00117
Tobacco	-0.00677***	0.00251**	-0.00741***	-0.00220	-0.00117	0.03983***
Prepared Food	-0.01020***	-0.00297***	-0.00413***	-0.00061	-0.00454***	0.00056
Spices [c]	0.00232	-0.00048	0.00230	-0.00201	0.00118	-0.00026

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.03772***	-0.00092	-0.10207***	-0.01599**	-0.00030	0.01629	0.13599***
Non Rice Staple	-0.00090**	0.00060*	0.00136	0.00102	-0.00353	0.00251*	-0.00044
Fish	-0.00666***	0.00008	-0.01113***	0.00311	-0.00715	0.00404*	0.00342
Meat	-0.01020***	0.00232***	-0.03627***	0.00910*	0.00784	-0.01693*	0.00557**
Eggs and Milk	-0.00297***	-0.00048	0.00287	0.00209	0.01430	-0.01639***	-0.01216***
Legumes	-0.00413***	0.00229***	-0.01464***	0.00287	0.00476	-0.00762	0.00716***
Fruit & Vegetable	-0.00061	-0.00201***	0.01288***	0.00686	-0.00094	-0.00592	-0.01912***
Edible Oil	-0.00454***	0.00118***	-0.01018***	-0.00303	0.00009	0.00294	-0.00014
Tobacco	0.00056	-0.00026	0.03902***	0.01472**	-0.02861	0.01389***	-0.03217***
Prepared Foods	0.07041***	-0.00323***	0.11804***	-0.01407*	0.01850	-0.00443**	-0.08230***
Spices [c]	-0.00323	0.00043	0.00012	-0.00667	-0.00495	0.01162	-0.00581

Note: *: p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.5 Parameter Estimates for the LA/AIDS Model Based on the 1993 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.38858***	0.09829***	-0.05124	-0.04705*	0.04422***	0.00202	-0.01158***
Non Rice Staple	-0.10448***	0.06942***	0.08470	-0.15412***	0.00202	0.00193*	-0.00172**
Fish	0.01383	0.00956	0.03856	-0.04812**	-0.01158***	-0.00172***	0.01707***
Meat	0.14945***	-0.05462***	-0.00133	0.05595	0.00707***	-0.00099*	0.00006
Eggs and Milk	0.07183***	-0.02164**	-0.01563	0.03727	-0.00157	0.00068	0.00004
Legume	0.08848***	-0.01942*	-0.00290	0.02232	-0.00294	0.00150**	0.00038
Fruit & Vegetable	0.02056	-0.02212*	-0.00809	0.03021	-0.00487***	-0.00114*	0.00180***
Edible Oil	0.12488***	0.00054	-0.00922	0.00868	0.02943***	0.00085**	-0.00194***
Tobacco	0.06284***	-0.05305***	0.01943	0.03362	-0.02811***	-0.00283***	0.00042
Prepared Foods	0.15469***	0.00234	-0.05321	0.05087***	-0.02829***	-0.00160**	-0.00409***
Spices [c]	0.02934	-0.00930	-0.00107	0.01037	-0.00538	0.00130	-0.00043

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	0.00707***	-0.00157	-0.00294	-0.00487***	0.02943***	-0.02811***
Non Rice Staple	-0.00099*	0.00068	0.00150**	-0.00114*	0.00085**	-0.00283***
Fish	0.00006	0.00004	0.00038	0.00180***	-0.00194***	0.00042
Meat	0.01557***	0.00119**	-0.00132	-0.00425***	-0.01136***	0.00177*
Eggs and Milk	0.00120**	0.00152***	0.00177***	0.00072	0.00079**	-0.00182**
Legume	-0.00132	0.00177***	0.00577***	-0.00197**	0.00131*	-0.00402***
Fruit & Vegetable	-0.00425***	0.00072	-0.00197**	0.01158***	-0.00326***	-0.00051
Edible Oil	-0.01136***	0.00079**	0.00131*	-0.00326***	-0.01226***	0.00012
Tobacco	0.00177*	-0.00182**	-0.00402***	-0.00051	0.00012	0.03298***
Prepared Food	-0.00947***	-0.00292***	-0.00333***	0.00074	-0.00503***	0.00361***
Spices [c]	0.00173	-0.00041	0.00284	0.00116	0.00135	-0.00160

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.02829***	-0.00538***	-0.10811***	-0.02877***	0.01252	0.01626	0.12759***
Non Rice Staple	-0.00160**	0.00130***	0.04420***	-0.01085**	-0.03185	0.04271***	0.01367***
Fish	-0.00409***	-0.00043	0.01774***	-0.00181	-0.01120	0.01300**	-0.01121***
Meat	-0.00947***	0.00173***	-0.03149***	0.01257***	0.00341	-0.01598	0.00611***
Eggs and Milk	-0.00292***	-0.00041	-0.00839***	0.00542*	0.00636	-0.01179**	-0.00524***
Legumes	-0.00333***	0.00284***	-0.00496	0.00275	0.00220	-0.00495	-0.01147***
Fruit & Vegetable	0.00074	0.00116***	0.01387***	0.00430	0.00383	-0.00813	-0.01463***
Edible Oil	-0.00503***	0.00134***	-0.01197***	-0.00022	0.00277	-0.00255	-0.00347***
Tobacco	0.00361***	-0.00160***	0.02766***	0.01408***	-0.00293	-0.01115	-0.03905***
Prepared Foods	0.05183***	-0.00146***	0.05407***	-0.00155	0.01482	-0.01327**	-0.04797***
Spices [c]	-0.00146	0.00091	0.00738	0.00408	0.00007	-0.00415	-0.01433

Note: *: p < .10; **: p < 0.05; ***:bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.6 Parameter Estimates for the LA/AIDS Model Based on the 1996 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.25999***	0.14216***	-0.17063	0.02847	0.10770***	-0.00062	-0.01199***
Non Rice Staple	0.00871	0.00538	-0.00866	0.00328	-0.00062	0.00610***	-0.00152***
Fish	0.13138***	-0.04917***	0.10218	-0.05301***	-0.01199***	-0.00152***	0.01930***
Meat	0.19436***	-0.10959***	0.10043	0.00916	-0.01586***	0.00254***	0.00040
Eggs and Milk	0.10731***	-0.03267	0.12443	-0.09176***	-0.00357	-0.00063	0.00179**
Legume	0.03742***	0.02751*	-0.03625	0.00874	-0.00164***	0.00156*	-0.00268***
Fruit & Vegetable	0.04594***	-0.08497***	0.08216	0.00281	-0.01210***	-0.00039	0.00235***
Edible Oil	0.07617***	0.02069**	-0.02989	0.00920	0.01617***	-0.00053	-0.00270**
Tobacco	0.02618	-0.05489**	0.04031	0.01458	-0.03263***	-0.00288***	-0.00047
Prepared Foods	0.06642***	0.13026***	-0.19534	0.06508***	-0.04090***	-0.00415***	-0.00396***
Spices [c]	0.04612	0.00529	-0.00875	0.00346	-0.00456	0.00054	-0.00051

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	-0.01586***	-0.00357***	-0.00164	-0.01210***	0.01617***	-0.03263***
Non Rice Staple	0.00254***	-0.00063	0.00156**	-0.00039	-0.00053	-0.00289***
Fish	0.00040	0.00178**	-0.00268***	0.00235***	-0.00270***	-0.00047
Meat	0.02352***	-0.00090	-0.00349**	-0.00052	-0.00342***	0.00243
Eggs and Milk	-0.00090	-0.00259**	0.00094	-0.00006	0.00095**	0.00369***
Legume	-0.00349**	0.00094	0.00915***	-0.00206**	0.00478***	0.00434**
Fruit & Vegetable	-0.00052	-0.00006	-0.00206**	0.02609***	-0.00252***	-0.00101
Edible Oil	-0.00342***	0.00095**	0.00478***	-0.00252***	-0.00746**	0.00043
Tobacco	0.00243	0.00369***	0.00434	-0.00101	0.00043	0.04536***
Prepared Food	-0.00529***	-0.00048	-0.01110***	-0.00930***	-0.00459***	-0.01797***
Spices [c]	0.00058	0.00088	0.00020	-0.00048	-0.00111	-0.00128

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.04090***	-0.00456***	-0.07069***	-0.03064***	0.04600	-0.01536**	0.11999***
Non Rice Staple	-0.00415***	0.00054	-0.00047	-0.00037	0.00168	-0.00131	0.00294***
Fish	-0.00396***	-0.00051**	-0.02381***	0.01057**	-0.02430	0.01373***	0.00187
Meat	-0.00529***	0.00058	-0.04119***	0.02553***	-0.03032	0.00480	0.00003
Eggs and Milk	-0.00048	0.00088***	-0.00828*	0.00600	-0.03292	0.02691***	-0.01276***
Legumes	-0.01109***	0.00020	-0.00265	-0.00710*	0.01036	-0.00326	0.00439**
Fruit & Vegetable	-0.00930***	-0.00048	0.00154	0.01889***	-0.02334	0.00444	-0.02293***
Edible Oil	-0.00459***	-0.00111***	-0.01020***	-0.00498**	0.00728	-0.00230	0.00342***
Tobacco	-0.01797***	-0.00128*	0.02258***	0.01344**	-0.00831	-0.00513	-0.02863***
Prepared Foods	0.10071***	-0.00297***	0.13703***	-0.03014***	0.05162	-0.02149***	-0.06753***
Spices [c]	-0.00298***	0.00872	-0.00386	-0.00120	0.00225	-0.00105	-0.00079

Note: *: p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.7 Parameter Estimates for the LA/AIDS Model Based on the 1996 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.30791***	0.04109	0.04096	-0.08205**	0.11334***	-0.02431***	-0.01601***
Non Rice Staple	0.05591***	0.02025	-0.01523	-0.00502	-0.02431***	0.03077***	-0.00314***
Fish	0.05055***	-0.00721	-0.03924	0.04645***	-0.01601***	-0.00314***	0.01732***
Meat	0.14639***	-0.07173***	0.02880	0.04293***	-0.00614***	0.00366***	-0.00191***
Eggs and Milk	0.08341***	-0.02115*	0.03310	-0.01195	-0.00296***	-0.00155**	-0.00070*
Legume	0.04397***	0.00147	-0.00622	0.00475	-0.00562***	0.00335***	0.00124*
Fruit & Vegetable	0.03687***	-0.04477***	0.06456	-0.01979	-0.00460***	0.00014	0.00311***
Edible Oil	0.14115***	-0.01719*	0.03168	-0.01449	0.03231***	0.00034	0.00094***
Tobacco	0.01769	-0.03844**	-0.01041	0.04885**	-0.02968***	-0.00148	0.00244***
Prepared Foods	0.08151***	0.12830***	-0.10962	-0.01868	-0.05162***	-0.00489***	-0.00408***
Spices [c]	0.03464	0.00938	-0.01839	0.00901	-0.00471	-0.00289	0.00080

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	-0.00614***	-0.00296***	-0.00562***	-0.00460***	0.03231***	-0.02968***
Non Rice Staple	0.00366***	-0.00155**	0.00335***	0.00013	0.00034	-0.00148
Fish	-0.00191***	-0.00070*	0.00124**	0.00311***	0.00094**	0.00244***
Meat	0.01903***	-0.00108***	-0.00005	-0.00233***	-0.00820***	-0.00015
Eggs and Milk	-0.00108**	0.00062	0.00092**	0.00052	0.00192***	0.00136**
Legume	-0.00005	0.00092**	0.00521***	0.00102	-0.00042	0.00022
Fruit & Vegetable	-0.00233***	0.00052	0.00102	0.00578***	-0.00364**	0.00363***
Edible Oil	-0.00820***	0.00192***	-0.00042	-0.00364***	-0.02326***	0.00361***
Tobacco	-0.00015	0.00136**	0.00022	0.00363***	0.00361***	0.03112***
Prepared Food	-0.00231***	0.00147***	-0.00716***	-0.00529***	-0.00329***	-0.01023***
Spices [c]	-0.00051	-0.00053	0.00130	0.00167	-0.00032	-0.00084

MODEL	COMMODITY PRICES		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.05162***	-0.00472***	-0.09119***	-0.01376*	-0.00440	0.01817	0.10056***
Non Rice Staple	-0.00489***	-0.00288***	-0.01157***	0.00222	0.00102	-0.00324	0.03235***
Fish	-0.00408***	0.00080***	-0.00093	0.00261	0.00836	-0.01096***	0.00103
Meat	-0.00231***	-0.00051	-0.02606***	0.01805***	-0.01154	-0.00651*	-0.00101
Eggs and Milk	0.00147***	-0.00053***	-0.00788***	0.00480	-0.01021	0.00542*	-0.00421***
Legumes	-0.00716***	0.00130***	0.00108	-0.00117	0.00274	-0.00158	-0.00768***
Fruit & Vegetable	-0.00529***	0.00167***	0.00199	0.00930**	-0.01816	0.00887**	-0.01296***
Edible Oil	-0.00329***	-0.00032	-0.01893***	0.00457*	-0.00798	0.00341	-0.00081
Tobacco	-0.01023***	-0.00084*	0.02819***	0.00872*	0.00240	-0.01112**	-0.03488***
Prepared Foods	0.09046	-0.00307***	0.12417***	-0.03323***	0.03282	0.00041	-0.06816***
Spices [c]	-0.00307	0.00910	0.00113	-0.00210	0.00497	-0.00287	-0.00423

Note: *: p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.8 Parameter Estimates for the LA/AIDS Model Based on the 1999 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.20433***	0.04987**	-0.03882	-0.01105	0.08999***	-0.00381***	-0.01542***
Non Rice Staple	0.01927**	0.02442**	-0.02381	-0.00060	-0.00382***	0.00722***	0.00022
Fish	0.11637***	-0.01589	0.03230	-0.01641	-0.01542***	0.00021	0.02296***
Meat	0.16798***	-0.06886***	0.03986	0.02900**	-0.00239	0.00436***	0.00016
Eggs and Milk	0.13368***	-0.03789***	-0.00176	0.03965**	-0.00763***	-0.00257***	0.00034
Legume	0.02743**	0.01071	-0.00185	-0.00886	0.00092	-0.00129*	-0.00184***
Fruit & Vegetable	0.05634***	-0.00903	-0.00163	0.01066	-0.01184***	-0.00136**	-0.00035
Edible Oil	0.09478***	0.00535	-0.00316	-0.00219	0.00529***	0.00052	-0.00305***
Tobacco	-0.18798***	0.08406***	-0.14213	0.05807***	-0.00226	0.00295***	0.00279***
Prepared Foods	0.31390***	-0.05104**	0.14089	-0.08986***	-0.04928***	-0.00524***	-0.00582***
Spices	0.05390	0.00830	0.00010	-0.00840	-0.00356	-0.00099	0.00002

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	-0.00239	-0.00763***	0.00092	-0.01184***	0.00529***	-0.00226
Non Rice Staple	0.00436***	-0.00257***	-0.00129*	-0.00137**	0.00052	0.00295***
Fish	0.00016	0.00034	-0.00184***	-0.00035	-0.00305***	0.00279***
Meat	0.00122	-0.00141**	0.00153*	0.00051	-0.00011	-0.00226***
Eggs and Milk	-0.00141**	0.01032***	0.00206***	-0.00008	-0.00169***	0.00341***
Legume	0.00153*	0.00206***	0.00836***	-0.00269***	0.00756***	-0.00208**
Fruit & Vegetable	0.00051	-0.00008	-0.00269***	0.02224***	-0.00087	0.00156**
Edible Oil	-0.00011	-0.00169***	0.00756***	-0.00087	-0.00631***	0.00734***
Tobacco	-0.00226***	0.00341***	-0.00208**	0.00156**	0.00734***	0.00622***
Prepared Food	-0.00157*	-0.00088	-0.01436***	-0.00699***	-0.00666***	-0.01785***
Spices	-0.00005	-0.00187	0.00183	-0.00013	-0.00202	0.00019

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			House-hold Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.04928***	-0.00356***	-0.04953***	-0.00827	-0.00398	-0.01536	0.07742***
Non Rice Staple	-0.00524***	-0.00099***	-0.00351*	-0.00492**	-0.00019	-0.00131	0.00641***
Fish	-0.00582***	0.00002	-0.01916***	0.00129	0.00529	0.01373	0.00548***
Meat	-0.00157*	-0.00005	-0.02846***	0.01507***	-0.00237	0.00480	0.00738***
Eggs and Milk	-0.00088	-0.00187***	-0.02104***	0.00733*	-0.00471	0.02691	0.00274*
Legumes	-0.01436***	0.00183***	-0.00305	-0.00282	0.00139	-0.00326	-0.00095
Fruit & Vegetable	-0.00698***	-0.00013	-0.00387*	0.00078	0.00020	0.00444	-0.00632***
Edible Oil	-0.00666***	-0.00201***	-0.01097***	-0.00159	0.00046	-0.00230	0.00335***
Tobacco	-0.01785***	0.00019	0.07087***	-0.01975***	-0.01533	-0.00513	-0.02316***
Prepared Foods	0.11454***	-0.00590***	0.07411***	0.01525**	0.01745	-0.02149***	-0.07266***
Spices	-0.00590	0.01248	-0.00540	-0.00235	0.00178	-0.00105	0.00031

Note: *: p < .10; **: p < 0.05; ***: bp < 0.01

a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.9 Parameter Estimates for the LA/AIDS Model
Based on the 1999 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL	Intercept	Income Group Based- Dummy			Commodity Prices		
		Lower	Middle[a]	Higher	Rice	N.Rice.S	Fish
Rice	0.30874***	-0.01973	0.13735	-0.11762***	0.07671***	-0.01706***	-0.01192***
Non Rice Staple	-0.13810***	0.07470***	-0.20310	0.12840***	-0.01706***	0.02499***	-0.00091
Fish	0.05717***	-0.00760	0.00953	-0.00193	-0.01192***	-0.00091	0.02022***
Meat	0.15254***	-0.07059***	0.05898	0.01161	0.00812***	-0.00116	-0.00518***
Eggs and Milk	0.09281***	-0.04293***	0.01904	0.02389**	-0.00595***	-0.00157***	-0.00065**
Legume	0.05063***	-0.01447	0.00984	0.00463	-0.00734***	0.00265***	0.00213***
Fruit & Vegetable	0.05233***	-0.03274***	0.03647	-0.00373	-0.00685***	-0.00077	-0.00115***
Edible Oil	.15790***	0.00079	0.02045	-0.02124*	0.03225***	0.00336	0.00105**
Tobacco	-0.11255***	0.07752***	-0.08576	0.00824	-0.00197**	0.00041	0.00065
Prepared Foods	0.32408***	0.03619**	-0.00828	-0.02791	-0.05937***	-0.00975***	-0.00518***
Spices	0.05445	-0.00114	0.00548	-0.00434	-0.00663	-0.00019	0.00094

MODEL	COMMODITY PPRICES					
	Meat	Egg & Milk	Legumes	Fruit &V.	Edible Oil	Tobacco
Rice	0.00812***	-0.00595***	-0.00734***	-0.00685***	0.03225***	-0.00197**
Non Rice Staple	-0.00116	-0.00157***	0.00265***	-0.00077	0.00336***	0.00041
Fish	-0.00518***	-0.00065**	0.00213***	-0.00115***	0.00105**	0.00065
Meat	0.00171	0.00174***	0.00201***	0.00172**	-0.00248***	0.00010
Eggs and Milk	0.00174***	0.00494***	0.00025	-0.00026	0.00109***	0.00064*
Legume	0.00201***	0.00025	0.00984***	-0.00165***	0.00435***	-0.00016
Fruit & Vegetable	0.00172***	-0.00026	-0.00165***	0.01554***	-0.00307***	0.00211***
Edible Oil	-0.00248***	0.00109***	0.00435***	-0.00307***	-0.03502***	0.00052
Tobacco	0.00010	0.00064*	-0.00016	0.00211***	0.00052	-0.00243***
Prepared Food	-0.00524***	0.00028	-0.01157***	-0.00577***	-0.00280***	-0.00016
Spices	-0.00134	-0.00050	-0.00051	0.00016	0.00073	0.00028

MODEL	Commodity Prices		Total Budget Shares	Dummy Effect on Budget Share			Household Size
	Prepared Foods	Spices		Lower	Middle[b]	Higher	
Rice	-0.05937***	-0.00663***	-0.09448***	0.00071	-0.02806	0.02734***	0.08320***
Non Rice Staple	-0.00975***	-0.00019	0.04206***	-0.00612	0.04264	-0.03652***	0.02113***
Fish	-0.00518***	0.00095***	-0.00238	0.00146	-0.00165	0.00020	0.00291**
Meat	-0.00524***	-0.00134***	-0.02403***	0.01526***	-0.01567	0.00041	0.00077
Eggs and Milk	0.00028	-0.00050***	-0.01363***	0.00959***	-0.00665	-0.00294	-0.00061
Legumes	-0.01157***	-0.00051	-0.00564***	0.00232	-0.00281	0.00049	-0.00926***
Fruit & Vegetable	-0.00577***	0.00016	-0.00285*	0.00689***	-0.00992	0.00303	-0.00810***
Edible Oil	-0.00280***	0.00073*	-0.02179***	-0.00195	-0.00339	0.00533**	0.00054
Tobacco	-0.00016	0.00028	0.05946***	-0.02012***	0.02306	-0.00293	-0.03281***
Prepared Foods	0.10363***	-0.00408***	0.06585***	-0.00823**	0.00339	0.00484	-0.05361***
Spices	-0.00407	0.01115	-0.00257	0.00019	-0.00093	0.00074	-0.00417

Note:
* : p < .10 ; ** : p < 0.05; *** : bp < 0.01
a, b, c: parameter estimates are recovered by applying the model's restrictions.

Table 6.10 The Results Summary:
Number of statistically significant Estimates
Summarized from the estimation results with LA/AIDS Model:
SUSENAS Micro Data East Java, Indonesia

TABLE	Number of statistically significant Estimates						
	α	β	γ	Dummy	δ	TOTAL	
	Intercept (out of 10)	Expenditure (out of 30)	Prices (out of 100)	Income Group (out of 20)	Household Size (out of 10)	Number (out of 170)	In Percentage (%)
6.2 : Urban90	6	13	60	8	6	93	55
6.3 : Rural 90	9	23	76	14	10	132	78
6.4 : Urban93	10	18	69	10	7	114	67
6.5 : Rural 93	8	18	84	11	10	131	77
6.6 : Urban96	8	19	76	11	8	122	72
6.7 : Rural 96	9	18	87	10	7	131	77
6.8 : Urban99	10	15	78	10	9	122	72
6.9 : Rural 99	10	17	86	10	7	130	76

The result is displayed fully, with the intention to provide some ideas about the signs, magnitudes of parameter estimates and the fitness of the model performance.

In the tables, one observes the coefficient of each parameter and their corresponding statistical significance as indicated by p-values. The model was estimated with imposition of homogeneity and symmetry restrictions.

As can be followed in the tables, own price, budget shares and household size determined significantly the variation of food consumption of the households investigated with significant level mostly 0.01. The presence of dummy for income groups indicated also their significant influence, with exception for some food groups, in which their presence in the model is not insignificant. The income group dummies work mostly in both manners: shifting the curve and changing the slope of related demand curve for each food group. Thus, households from different income groups will behave differently in their consumption of the same food group.

In term of sign and magnitude, all own prices displayed satisfying performance. They affects significantly different from zero, and move in the directions that conform theory consistently.

Concerning the cross price parameters, not all of them display a significant influence statistically. But this is not surprising. In the situation where any food group dominates the share of household's budget, it is possible that the presence of the other not significant. The

model represents the real food consumption of households in East Java plausibly. This holds for both areas under studied, urban and rural.

6.3 The Results of the Restrictions Test

Using likelihood ratio statistics described in Section 5.7, the study come to the test result shown in Table 6. 11. As can be followed in the Table 6.11, the theoretical restrictions tested are the model with homogeneity vs. unrestricted model, model with symmetry vs. unrestricted model, and model homogeneity and symmetry simultaneously imposed vs. unrestricted model. Since the specification of significance level for a large number of tests is arbitrary, the critical levels presented in Table 6.12 displays a variety of possibilities. One can evaluate the test statistics with reference of this table. The comparison between the calculated Chi-squared test statistics in Table 6.11 and the corresponding critical level in Table 6.12 indicates that in all cases, the calculated statistics are far greater than the corresponding critical levels, meaning that the data rejected the validity of restrictions imposed. It suggests that homogeneity and symmetry conditions either alone or jointly are strongly violated by the data. It is evident that the test suffered from over rejection.

Table 6.11 Test Results

TYPES OF RESTRICTIONS TEST	D.F	TEST STATISTICS – 2 Log λ								Conclusion
		1990		1993		1996		1999		
		Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rejected
Ho: Homogeneity H1: Unrestricted	10	391.79	79.35	415.39	213.26	443.49	301.88	797.98	417.73	Rejected
Ho: Symmetry H1: Unrestricted	20	1087.7	176.58	1457.3	425.87	1630.3	608.57	2102.9	990.34	Rejected
Ho: Symmetry H1: Homogeneity	46	1186.9	201.19	1643.1	599.21	2013.8	715.94	2570.1	1268.7	Rejected
Ho: Homogeneity Symmetry H1: unrestricted	56	695.98	97.23	1041.9	212.60	1186.8	306.69	1304.9	572.60	Rejected

*) Degree of freedom

Table 6.12 Critical Values of χ^2

Degree of Freedom	Level of Significance			
	0.100	**0.050**	**0.025**	**0.010**
10	15.99	18.30	20.48	23.21
20	28.41	31.41	34.17	37.57
40	51.81	55.76	59.34	63.69
50	63.17	67.50	71.42	76.15
60	74.40	79.09	83.30	88.38
70	85.53	90.53	95.02	100.42

Degree .of freedom for model_1 = 10; Model 2 = 20, Model 3 = 46; Model 4 = 56.
Source: Griffiths *et.al* (1993)

While the interpretation for that cannot be clearly given, the rejection of demand restrictions by the data is actually a common finding in many previous studies of this type, such as Deaton and Muellbauer (1980b, pp.68-73); Blanciforti and Green (1983, 19986); Mergos and Donatos, (1989), Caps (1993), Cozzarin and Gilmour (1998) or Chang (2000). The following arguments are proposed in the literature to explain this rejection phenomenon:

1. Rejection due to data problems (Deaton and Muellbauer (1980a)
2. Rejection due to measurement errors and the use of proxy variables
3. Rejection because of model misspecification including the ignorance of dynamic effects, variable omission, lagged dependent variables and price expectations (Chang, 2000).
4. Rejection due to the rigidity of the AIDS model itself (Syriopoulos and Sinclair (1993), and the use of Stone index and associated problems

It does not necessarily mean however, that the theory is wrong; it may be rather the case, that the data and model combined do not support the theory either because of data property, and/or model specification (Chang, 2000).

Because of that reasons, in the estimation we imposed both of restrictions to assure that the results are achieved in assurance of theoretical foundation.

6.4 Price Elasticities

Our concern is the demand elasticity of own- and cross prices for both neo-classical types: Marshallian and Hicksian elasticities. Marshallian or ordinary price elasticity is defined from the Marshallian demand function (Chapter 4): that is, a demand function obtained from utility maximization subject to budget constraint. Hicksian or compensated price elasticity is elasticity obtained through solving the dual problem of expenditure minimization at a certain utility level. The compensated price elasticity measures a response of consumer on the price change, given that their income be compensated, thus at a constant purchasing power. The ordinary price elasticity indicates an overall response of consumer on changing prices, -of own or other goods, without compensation on their income.

Knowing both of them is important, as they reveal exhaustive information to describe household's reaction on price changes. This delivers an important advantage on the use of the study in policy making. The question of whether price or income should be used as a policy instrument may be directed from the elasticities of both types.

In analyzing the elasticities, we pay always ourr attention on that food group with a relative high budget share, thus rice and prepared foods. Rice may be, as indicated by the share assessment above, our focus because of its "strategic" status in as a political issue.

Table 6.13 Ordinary Own Price Elasticities
Based on the SUSENAS Micro Data 1990, 1993, 1996 and 1999:
Urban East Java, Indonesia

Food Composites	URBAN AREAS			
	1990	1993	1996	1999
Rice	-0.4750	-0.3673	-0.3903	-0.5021
Non Rice Staple	-0.7147	-0.8395	-0.7117	-0.6713
Fish	-0.6910	-0.6660	-0.7762	-0.6031
Meat	-0.8337	-0.7753	-0.7157	-0.9659
Eggs and Milk	-1.1399	-0.9477	-1.0673	-0.7907
Legumes	-0.7900	-0.8697	-0.8121	-0.8519
Fruit & Vegetable	-0.6296	-0.5802	-0.4440	-0.4569
Edible Oil	-1.1145	-0.9167	-1.1462	-1.1199
Tobacco	-0.6597	-0.6780	-0.6393	-0.9802
Prepared Foods	-0.7479	-0.8495	-0.7136	-0.7337
Spices	-0.9955	-1.0046	-0.9852	-0.9787

Table 6.14 Ordinary Own Price Elasticities
Based on the SUSENAS Micro Data 1990, 1993, 1996 and 1999:
Rural East Java, Indonesia

Food Composites	RURAL AREAS			
	1990	**1993**	**1996**	**1999**
Rice	-0.6892	-0.7033	-0.4863	-0.6209
Non Rice Staple	-0.7254	-0.9701	-0.4760	-0.6427
Fish	-0.6928	-0.7325	-0.6759	-0.6179
Meat	-0.9442	-0.8038	-0.7615	-0.9691
Eggs and Milk	-0.9444	-0.9699	-0.9891	-0.8798
Legumes	-0.9193	-0.8972	-0.8995	-0.8169
Fruit & Vegetable	-0.7357	-0.6582	-0.8426	-0.6047
Edible Oil	-1.1413	-1.2062	-1.4102	-1.5832
Tobacco	-0.7906	-0.7043	-0.7041	-1.0636
Prepared Foods	-0.7091	-0.8134	-0.6856	-0.6381
Spices	-1.0023	-1.0028	-0.9871	-0.9872

6.4.1 Own Price Elasticities

The ordinary own price elasticities in all survey periods, are displayed in Table 6.13 (urban sector) and Table 6.14 (rural sector), while the compensated own price elasticities are in Table 6.15 (urban sector) and 6.16 (rural sector).

As can be observed in the tables, all own price elasticities of food composites in all survey periods reveal conformity with theoretical postulate. They are all negative in sign. In term of magnitude, most of food groups analyzed in this study are price inelastic, with exceptions to Eggs and Milks, edible oil and spices. “Egg and Milks” (urban sector in 1990 and 1996), edible oils (urban sector, in 1990, 1996 and 1999; rural sector in all survey periods), and spice (urban: 1993; rural: 1990, 1993) they have own price elasticities exceeding unity. Thus, food groups under investigation were, in general less responsive to changes in price of food goods. This holds for all food groups in all period of surveys and across areas under study: the urban and rural.

It is notable, that ordinary own price of rice group is less elastic compared to the other food groups. This was consistent with general intuitive proposition for staple food with no close substitute, which accounts for a dominant share of the consumer’s budget, as was the case of rice in this study. General phenomenon indicates that food good with such characteristics has a low own price elasticity.

It is also of our interest to identify the effects of changing economy from 1996 to 1999 due to the crisis. From own price elasticities we obtained, that here is no clear pattern of changing in ordinary own price elasticities. Some food groups, -rice, fish, meat, fruits & vegetables, tobacco, revealed an increase in magnitude, and some other a decline. So it is fair to conclude, that, the changing economic condition affected each of the individual food group differently.

Shown in Table 6.15 and 6.16, compensated elasticities indicate, that keeping purchasing power unchanged makes demand for food goods more price-inelastic.

It may also be concluded, that own price elasticities in rural areas are in general higher than that of urban sector.

Table 6.15 Compensated Own Price Elasticities
Based on SUSENAS Micro Data 1990, 1993, 1996 and 1999:
Urban East Java, Indonesia

MODEL	URBAN AREAS			
	1990	1993	1996	1999
Rice	-0.3641	-0.2811	-0.2767	-0.3578
Non Rice Staple	-0.6772	-0.8197	-0.6914	-0.6576
Fish	-0.6400	-0.6213	-0.6898	-0.5561
Meat	-0.7483	-0.7049	-0.6381	-0.9155
Eggs and Milk	-1.0414	-0.8644	-0.9891	-0.7553
Legumes	-0.6938	-0.8159	-0.7687	-0.7982
Fruit & Vegetable	-0.5565	-0.5152	-0.3831	-0.4187
Edible Oil	-1.0600	-0.8842	-1.1120	-1.0844
Tobacco	-0.5522	-0.5379	-0.4980	-0.8323
Prepared Foods	-0.4948	-0.4685	-0.3645	-0.3197
Spices	-0.9563	-0.96957	-0.9713	-0.9675

Table 6.16 Compensated Own Price Elasticities
Based on the SUSENAS Micro Data 1990, 1993, 1996 and 1999:
Rural East Java, Indonesia

MODEL	RURAL AREAS			
	1990	1993	1996	1999
Rice	-0.4744	-0.5719	-0.3078	-0.4422
Non Rice Staple	-0.6828	-0.9071	-0.4285	-0.5732
Fish	-0.6359	-0.6649	-0.6304	-0.5656
Meat	-0.8606	-0.7334	-0.6912	-0.9017
Eggs and Milk	-0.8999	-0.9210	-0.9400	-0.8433
Legumes	-0.8584	-0.8411	-0.8485	-0.7652
Fruit & Vegetable	-0.6623	-0.6032	-0.7894	-0.5589
Edible Oil	-1.0986	-1.1590	-1.3661	-1.5436
Tobacco	-0.6875	-0.5663	-0.5814	-0.9376
Prepared Foods	-0.4724	-0.5414	-0.3710	-0.3312
Spices	-0.9593	-0.9531	-0.9609	-0.9589

6.4.2 Cross Price Elasticities

Estimation results of cross price elasticity, ordinary and compensated, for each of survey period in urban and rural sectors are presented in Table 6.17 to 24 and Table 6.25 to 32 respectively.

The following pattern may be followed from the tables of cross price elasticities:

1. Change in prices of rice and prepared food groups have relatively considerable response on the majority of food groups. Inverse of the relationship was not the case.
2. Without income compensation, the relationship between rice price and other food groups is in general complementary. This holds also for the prepared food.
3. The relationship among majority of food groups may be complementary or competitive.
4. With income compensation when prices change, the cross response among food groups may be changing: from complementary to competitive, and vice versa. This indicates that income effect of price changes play an important role.
5. Seen from the magnitude of response, cross relationships among food groups are of less importance.
6. The fact that change of rice price was considerably responsive to other food groups, and not was the inverse, confirmed the prevalent phenomenon, that rice is the center of food menu of Indonesia. Overall, the own price elasticities are larger than that of cross price elasticities.

Table 6.17 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1990 SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.00915	-0.01911	0.02598	0.04466	0.01784	-0.03615	0.09347	-0.06125	0.01133	0.0043
Non Rice Staple	-0.28187		-0.06637	0.01224	0.11271	0.00621	-0.09219	0.01513	-0.08726	-0.04793	0.0035
Fish	-0.24342	-0.03279		0.02851	0.0085	-0.03567	0.06807	-0.02024	-0.02059	-0.03991	0.0454
Meat	-0.08535	0.00865	0.01382		-0.03676	0.05819	0.04693	-0.06067	0.06374	-0.17114	-0.0259
Eggs and Milk	-0.16639	0.04682	-0.04163	-0.12808		-0.04814	-0.1148	-0.02335	-0.01932	-0.21237	-0.0078
Legumes	-0.22143	-0.0079	-0.06012	0.03709	-0.01933		-0.00288	-0.01336	-0.24621	-0.15488	0.0005
Fruit & Vegetable	-0.57916	-0.08632	0.04588	0.03675	-0.1285	-0.01616		-0.16091	0.01702	-0.17935	0.0181
Edible Oil	0.34157	0.01014	-0.03543	-0.11814	0.01097	0.00288	-0.12598		-0.00999	-0.09269	-0.0197
Tobacco	-0.3413	-0.02439	-0.01688	0.04999	0.03284	-0.12604	0.03414	0.00058		-0.01413	0.0232
Prepared Foods	-0.21388	-0.01056	-0.02693	-0.08698	-0.02148	-0.03271	-0.01918	-0.02505	-0.02657		-0.0193
Spices	0.0007	0.0009	0.0033	-0.0009	0.0027	0.0023	0.0026	0.0003	0.0045	0.0018	

Table 6.18 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1990 SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.0205	-0.0250	0.0335	-0.0199	0.0148	0.0017	0.0724	-0.0351	-0.0883	0.0085
Non Rice Staple	0.0030		0.0056	0.0436	0.0429	0.0075	-0.0526	0.0325	0.0236	0.0995	0.0194
Fish	-0.2007	-0.0350		-0.0782	-0.0065	-0.0257	0.0526	-0.0032	0.0394	-0.0968	0.0437
Meat	0.0468	0.0030	-0.0499		0.0179	0.0651	0.0037	-0.0598	0.0218	-0.0579	-0.0203
Eggs and Milk	-0.1948	0.0402	-0.0070	0.0331		0.0654	-0.0090	0.0299	0.0097	-0.0094	0.0030
Legumes	-0.0256	-0.0406	-0.0323	0.0905	0.0484		-0.0305	-0.0307	-0.0963	-0.0917	0.0224
Fruit & Vegetable	-0.3493	-0.2580	0.0265	-0.0799	-0.0578	-0.0964		-0.1461	-0.0481	-0.2366	-0.0268
Edible Oil	0.3761	0.0261	0.0072	-0.0840	0.0333	-0.0161	-0.0565		0.0543	-0.0177	0.0032
Tobacco	-0.2669	-0.0400	0.0132	-0.0008	-0.0067	-0.0720	0.0063	0.0119		-0.0763	-0.0262
Prepared Foods	-0.3260	-0.0252	-0.0524	-0.0627	-0.0199	-0.0436	-0.0261	-0.0345	-0.0462		-0.0220
Spices	-0.0217	-0.0066	-0.0019	-0.0084	-0.0028	-0.0022	-0.0025	-0.0039	-0.0072	-0.0138	-1.0023

Table 6.19 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1993 SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.0071	-0.0350	0.0313	-0.0120	0.0390	-0.0419	0.0410	-0.0520	-0.0351	0.0156
Non Rice Staple	-0.1766		-0.0151	0.1048	-0.0012	0.0063	-0.0052	0.0328	-0.0535	-0.0286	0.0303
Fish	-0.1858	-0.0011		0.0642	0.0206	-0.0238	0.0793	-0.0353	0.0357	-0.0457	0.0101
Meat	-0.0029	0.0278	0.0407		0.0297	0.0004	-0.0056	-0.0248	-0.0506	-0.0580	0.0332
Eggs and Milk	-0.2193	-0.0079	-0.0139	-0.0045		0.0256	-0.0098	0.0129	0.0047	-0.1249	-0.0181
Legumes	0.0366	0.0034	-0.0317	-0.0084	0.0533		-0.0307	0.0670	-0.1084	-0.0380	0.0417
Fruit & Vegetable	-0.3910	-0.0122	0.0645	-0.0673	-0.0206	-0.0730		-0.0588	-0.0953	-0.1194	-0.0582
Edible Oil	0.1233	0.0199	-0.0443	-0.0421	0.0552	0.0992	-0.0266		0.0073	-0.0253	0.0356
Tobacco	-0.2563	-0.0155	-0.0096	-0.0787	0.0079	-0.0779	-0.0291	-0.0203		-0.0516	-0.0098
Prepared Foods	-0.2438	-0.0135	-0.0544	-0.0823	-0.0417	-0.0450	-0.0240	-0.0394	-0.0523		-0.0291
Spices	-0.0364	-0.0028	-0.0101	-0.0129	-0.0123	-0.0062	-0.0088	-0.0073	-0.0138	-0.0472	-1.0046

Table 6.20 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1993 SUSENAS - Micro Data: Rural -East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0377	-0.0147	0.0693	0.0159	0.0157	-0.0036	0.1423	-0.0618	-0.0113	-0.0015
Non Rice Staple	0.0266		-0.0295	-0.0182	0.0099	0.0230	-0.0192	0.0125	-0.0484	-0.0310	0.0201
Fish	-0.2040	-0.0321		-0.0056	-0.0029	0.0018	0.0263	-0.0352	-0.0008	-0.0806	-0.0099
Meat	0.1282	-0.0004	0.0119		0.0220	-0.0052	-0.0436	-0.1216	0.0382	-0.0731	0.0273
Eggs and Milk	-0.0538	0.0103	-0.0039	0.0199		0.0349	0.0134	0.0132	-0.0475	-0.0797	-0.0120
Legumes	-0.0523	0.0268	0.0068	-0.0235	0.0316		-0.0352	0.0234	-0.0716	-0.0593	0.0507
Fruit & Vegetable	-0.3303	-0.0782	0.0132	-0.1931	-0.0088	-0.1007		-0.1416	-0.0842	-0.1178	0.0087
Edible Oil	0.5600	0.0252	-0.0237	-0.1855	0.0215	0.0324	-0.0520		0.0184	-0.0546	0.0303
Tobacco	-0.3861	-0.0529	-0.0205	-0.0160	-0.0363	-0.0628	-0.0177	-0.0212		-0.0437	-0.0321
Prepared Foods	-0.2232	-0.0281	-0.0407	-0.0748	-0.0293	-0.0348	-0.0069	-0.0434	-0.0148		-0.0205
Spices	-0.0295	-0.0043	-0.0060	-0.0057	-0.0050	-0.0027	-0.0016	-0.0042	-0.0118	-0.0200	-1.0028

6.21 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1996 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0085	-0.0090	-0.0266	0.0161	0.0205	-0.0314	0.0984	-0.0875	-0.0425	-0.0077
Non Rice Staple	-0.0073		-0.0626	0.1278	-0.0235	0.0784	-0.0137	-0.0205	-0.1237	-0.1676	0.0277
Fish	-0.1407	-0.0178		0.0042	0.0204	-0.0315	0.0270	-0.0316	-0.0062	-0.0476	-0.0060
Meat	-0.1567	0.0322	0.0155		-0.0028	-0.0339	-0.0003	-0.0340	0.0429	-0.0273	0.0099
Eggs and Milk	-0.1475	-0.0191	-0.0055	-0.0497		-0.0058	-0.0193	-0.0028	0.0137	-0.1179	0.0044
Legumes	0.0231	0.0351	-0.0299	-0.0453	0.0330		-0.0282	0.1027	0.1118	-0.1447	0.0100
Fruit & Vegetable	-0.3905	-0.0204	0.0046	-0.0591	-0.0350	-0.0748		-0.0814	-0.0865	-0.3571	-0.0243
Edible Oil	0.4386	-0.0036	-0.0262	-0.0420	0.0442	0.1249	-0.0381		0.0540	0.0031	-0.0149
Tobacco	-0.3400	-0.0306	-0.0270	-0.0020	0.0156	0.0235	-0.0207	-0.0084		-0.2274	-0.0177
Prepared Foods	-0.2199	-0.0221	-0.0417	-0.0467	-0.0209	-0.0575	-0.0485	-0.0313	-0.1029		-0.0188
Spices	0.0627	0.0067	0.0178	0.0250	0.0192	0.0185	0.0117	0.0142	0.0354	0.0795	

Table 6.22 Ordinary Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1996 SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.0719	-0.0423	0.0047	0.0041	-0.0039	-0.00669	0.13977	-0.08015	-0.12156	-0.00881
Non Rice Staple	-0.3485		-0.0408	0.0786	-0.0159	0.0667	0.00905	0.01718	-0.00439	-0.03469	-0.04218
Fish	-0.2462	-0.0470		-0.0205	-0.0049	0.0315	0.06198	0.0264	0.06066	-0.03648	0.01924
Meat	-0.0269	0.0534	-0.0131		-0.0047	0.0084	-0.0219	-0.08713	0.01476	0.0109	-0.00132
Eggs and Milk	-0.0766	-0.0361	-0.0178	-0.0273		0.0171	0.00953	0.0384	0.02431	0.02041	-0.01274
Legumes	-0.0983	0.0655	0.0253	0.0016	0.0190		0.02031	-0.00629	0.00717	-0.12884	0.02549
Fruit & Vegetable	-0.3056	-0.0331	0.0613	-0.1242	-0.0129	-0.0014		-0.1459	0.05169	-0.30025	0.03424
Edible Oil	0.6377	0.0181	0.0279	-0.1317	0.0441	0.0028	-0.05946		0.08456	-0.01531	-0.00031
Tobacco	-0.3776	-0.0314	0.0105	-0.0242	0.0016	-0.0118	0.02888	0.0226		-0.16523	-0.01601
Prepared Foods	-0.3404	-0.0466	-0.0408	-0.0452	-0.0125	-0.0537	-0.03708	-0.03737	-0.08555		-0.02502
Spices	0.0299	0.0048	0.0085	0.0097	0.0046	0.0077	0.0055	0.0074	0.0120	0.0251	

Table 6.23 Ordinary Cross Price Elasticities Derived from the LA/AIDS Model for Food Based on the 1999 SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.0117	-0.0569	0.0083	-0.0208	0.0219	-0.0451	0.0399	0.0226	-0.1469	-0.0098
Non Rice Staple	-0.0903		0.0324	0.2188	-0.0935	-0.0349	-0.0448	0.0415	0.1736	-0.1152	-0.0342
Fish	-0.2147	0.0083		0.0167	0.0171	-0.0186	0.0028	-0.0410	0.0702	-0.0328	0.0056
Meat	0.0131	0.0713	0.0167		-0.0084	0.0369	0.0175	0.0097	-0.0075	0.0494	0.0051
Eggs and Milk	-0.0707	-0.0399	0.0267	-0.0035		0.0579	0.0125	-0.0150	0.1012	0.0884	-0.0261
Legumes	0.0317	-0.0204	-0.0271	0.0314	0.0395		-0.0430	0.1336	-0.0271	-0.2231	0.0333
Fruit & Vegetable	-0.2732	-0.0316	-0.0043	0.0171	0.0018	-0.0612		-0.0178	0.0458	-0.1482	-0.0014
Edible Oil	0.1629	0.0167	-0.0487	0.0145	-0.0217	0.1729	-0.0078		0.1819	-0.0616	-0.0358
Tobacco	-0.0861	0.0191	0.0058	-0.0414	0.0132	-0.0371	0.0008	0.0502		-0.2575	-0.0063
Prepared Foods	-0.2324	-0.0249	-0.0398	-0.0282	-0.0217	-0.0670	-0.0371	-0.0383	-0.0971		-0.0279
Spices	0.0888	0.0078	0.0264	0.0308	0.0201	0.0282	0.0175	0.0200	0.0486	0.1305	

Table 6.24 Ordinary Cross Price Elasticities Derived from the LA/AIDS Model for Food Based on the 1999 SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.0506	-0.0342	0.0536	-0.0124	-0.0151	-0.0175	0.1472	0.0162	-0.1759	-0.0197
Non Rice Staple	-0.2415		-0.0126	-0.0159	-0.0221	0.0383	-0.0107	0.0485	0.0066	-0.1372	-0.0025
Fish	-0.2214	-0.0163		-0.0967	-0.0117	0.0408	-0.0212	0.0206	0.0135	-0.0943	0.0182
Meat	0.1340	-0.0076	-0.0625		0.0277	0.0324	0.0269	-0.0262	0.0112	-0.0421	-0.0147
Eggs and Milk	-0.0970	-0.0248	-0.0065	0.0520		0.0145	0.0001	0.0342	0.0289	0.0456	-0.0072
Legumes	-0.1217	0.0522	0.0417	0.0407	0.0069		-0.0281	0.0827	0.0017	-0.1992	-0.0080
Fruit & Vegetable	-0.2224	-0.0329	-0.0396	0.0306	-0.0148	-0.0526		-0.0901	0.0382	-0.1942	-0.0009
Edible Oil	0.6317	0.0800	0.0348	-0.0185	0.0324	0.0920	-0.0405		0.0372	0.0292	0.0211
Tobacco	-0.1220	-0.0239	-0.0143	-0.0298	-0.0106	-0.0240	0.0079	-0.0179		-0.1014	-0.0079
Prepared Foods	-0.3059	-0.0579	-0.0348	-0.0409	-0.0100	-0.0614	-0.0335	-0.0263	-0.0235		-0.0237
Spices	0.0070	0.0036	0.0037	0.0030	0.0017	0.0022	0.0023	0.0040	0.0052	0.0091	

Table 6.25 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1990 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0040	0.0030	0.0597	0.0658	-0.01864	0.11249	-0.01967	0.09412	0.0187	0.0187
Non Rice Staple	0.0340		-0.0039	0.1075	0.1726	-0.04263	0.06895	0.03039	0.18635	0.0443	0.0443
Fish	0.0150	-0.0023		0.1065	0.0575	0.10862	0.02378	0.07567	0.15178	0.0787	0.0787
Meat	0.1978	0.0420	0.0698		0.0169	0.09135	-0.01244	0.16919	0.03885	0.0106	0.0106
Eggs and Milk	0.3473	0.1074	0.0600	0.0269		-0.0342	0.06416	0.17203	0.16867	0.0585	0.0585
Legumes	0.1880	0.0404	0.0209	0.1606	0.0582		0.0564	-0.09369	0.14882	0.0534	0.0534
Fruit & Vegetable	-0.1188	-0.0320	0.1370	0.1756	-0.0413	0.4426		0.18849	0.1621	0.0776	0.0776
Edible Oil	0.6603	0.0477	0.0276	-0.0220	0.0714	-0.07597	-0.06017		0.14371	0.0215	0.0215
Tobacco	-0.0528	0.0096	0.0402	0.1370	0.0875	0.0794	0.04973	0.44779		0.0604	0.0604
Prepared Foods	0.1269	0.0296	0.0405	0.0158	0.0431	0.03429	0.03301	0.10036	0.50488		0.0248
Spices	0.2753	0.0303	0.0524	0.0579	0.0812	0.0611	0.0418	0.0493	0.1026	0.2077	

Table 6.26 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1990 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0443	0.0174	0.0977	0.0139	0.0558	0.0284	0.1117	0.0265	0.0407	0.0376
Non Rice Staple	0.1471		0.0340	0.0866	0.0656	0.0350	-0.0347	0.0588	0.0648	0.1859	0.0389
Fish	0.0882	0.0519		0.0081	0.0390	0.0294	0.0885	0.0496	0.1220	0.0765	0.0828
Meat	0.3273	0.0873	0.0053		0.0620	0.1185	0.0386	-0.0085	0.1020	0.1103	0.0177
Eggs and Milk	0.0885	0.1254	0.0487	0.1176		0.1194	0.0262	0.0817	0.0907	0.1604	0.0414
Legumes	0.2928	0.0552	0.0304	0.1855	0.0985		0.0090	0.0275	-0.0052	0.0992	0.0656
Fruit & Vegetable	0.2291	-0.0841	0.1403	0.0927	0.0332	0.0139		-0.0403	0.1173	0.1102	0.0516
Edible Oil	0.6109	0.0967	0.0534	-0.0139	0.0702	0.0287	-0.0274		0.1215	0.1231	0.0351
Tobacco	0.0926	0.0681	0.0840	0.1065	0.0499	-0.0035	0.0509	0.0777		0.1392	0.0225
Prepared Foods	0.0679	0.0932	0.0251	0.0549	0.0421	0.0316	0.0228	0.0376	0.0664		0.0314
Spices	0.2896	0.0900	0.0625	0.0882	0.0401	0.0515	0.0405	0.0498	0.0786	0.2116	

Table 6.27 Compensated Cross Price Elasticities Derived from the LA/AIDS Model for Food Based on the 1993 SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0018	-0.0095	0.0694	0.0149	0.0648	-0.0225	0.0604	-0.0034	0.0741	0.0303
Non Rice Staple	0.0175		0.0418	0.1899	0.0589	0.0639	0.0380	0.0762	0.0550	0.2152	0.0632
Fish	-0.0323	0.0146		0.1315	0.0681	0.0218	0.1134	-0.0010	0.1216	0.1472	0.0361
Meat	0.1583	0.0443	0.0879		0.0796	0.0483	0.0303	0.0113	0.0395	0.1445	0.0606
Eggs and Milk	0.0482	0.0195	0.0645	0.1127		0.1050	0.0497	0.0727	0.1542	0.2111	0.0272
Legumes	0.2183	0.0220	0.0215	0.0713	0.1096		0.0098	0.1076	-0.0069	0.1902	0.0724
Fruit & Vegetable	-0.1013	0.0175	0.1495	0.0597	0.0692	0.0130		0.0060	0.0667	0.2446	-0.0091
Edible Oil	0.2699	0.0349	-0.0013	0.0222	0.1006	0.1428	0.0060		0.0893	0.1590	0.0605
Tobacco	-0.0061	0.0101	0.0638	0.0310	0.0854	-0.0036	0.0265	0.0357		0.2628	0.0326
Prepared Foods	0.0590	0.0175	0.0343	0.0504	0.0521	0.0449	0.0433	0.0283	0.1169		0.0223
Spices	0.2091	0.0206	0.0601	0.0923	0.0695	0.0640	0.0380	0.0512	0.1148	0.2568	

Table 6.28 Compensated Cross Price Elasticities Derived from the LA/AIDS Model for Food Based on the 1993 - SUSENAS Micro Data: Rural- East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0694	0.0176	0.1137	0.0392	0.0446	0.01284	0.17158	-0.01098	0.09384	0.01929
Non Rice Staple	0.2893		0.0348	0.0701	0.0563	0.0805	0.01338	0.07074	0.05257	0.17811	0.06136
Fish	0.0719	0.0341		0.0871	0.0459	0.0621	0.06052	0.02595	0.10524	0.13889	0.03337
Meat	0.3385	0.0500	0.0634		0.0592	0.0408	-0.01748	-0.07493	0.11906	0.09426	0.06032
Eggs and Milk	0.2220	0.0764	0.0635	0.1126		0.0952	0.04766	0.07437	0.05847	0.1397	0.0313
Legumes	0.2042	0.0883	0.0694	0.0627	0.0769		-0.00333	0.08027	0.02693	0.14482	0.09094
Fruit & Vegetable	0.1035	0.0259	0.1192	-0.0473	0.0678	-0.0059		-0.04547	0.08252	0.2274	0.07675
Edible Oil	0.7740	0.0765	0.0286	-0.1136	0.0593	0.0792	-0.02545		0.10062	0.11565	0.06392
Tobacco	-0.0286	0.0328	0.0669	0.1041	0.0269	0.0153	0.02664	0.05804		0.24073	0.02404
Prepared Foods	0.1179	0.0537	0.0427	0.0398	0.0310	0.0398	0.03546	0.03222	0.11627		0.0331
Spices	0.2939	0.0704	0.0686	0.0938	0.0571	0.0719	0.0357	0.0704	0.1126	0.2287	

Table 6.29 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1996 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0185	0.0311	0.0134	0.0444	0.0448	-0.0105	0.1196	-0.0335	0.0837	0.0038
Non Rice Staple	0.1892		0.0148	0.2052	0.0311	0.1254	0.0267	0.0205	-0.0195	0.0760	0.0499
Fish	0.0791	0.0037		0.0907	0.0815	0.0211	0.0722	0.0142	0.1103	0.2249	0.0188
Meat	0.0341	0.0508	0.0907		0.0503	0.0118	0.0389	0.0058	0.1441	0.2093	0.0315
Eggs and Milk	0.1596	0.0109	0.1154	0.0712		0.0677	0.0439	0.0613	0.1766	0.2629	0.0391
Legumes	0.1872	0.0511	0.0347	0.0194	0.0786		0.0055	0.1369	0.1988	0.0587	0.0286
Fruit & Vegetable	-0.0510	0.0127	0.1383	0.0745	0.0593	0.0064		-0.0105	0.0935	0.0638	0.0141
Edible Oil	0.5733	0.0096	0.0268	0.0110	0.0816	0.1571	-0.0104		0.1254	0.1701	0.0004
Tobacco	-0.0632	-0.0036	0.0819	0.1070	0.0925	0.0898	0.0362	0.0493		0.1158	0.0137
Prepared Foods	0.0675	0.0060	0.0714	0.0665	0.0589	0.0113	0.0106	0.0286	0.0495		0.0137
Spices	0.2154	0.0205	0.0595	0.0806	0.0609	0.0602	0.0395	0.0489	0.1187	0.2670	

Table 6.30 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1996 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		-0.03139	-0.00529	0.06182	0.035591	0.03154	0.01524	0.17694	-0.01504	0.02849	0.00969
Non Rice Staple	-0.13854		0.00275	0.14577	0.021064	0.10841	0.03482	0.06085	0.07211	0.1416	-0.02045
Fish	-0.02551	0.00301		0.05015	0.033948	0.07528	0.08906	0.07231	0.14107	0.14883	0.04208
Meat	0.19325	0.10325	0.03248		0.034059	0.05207	0.00511	-0.04134	0.09496	0.19573	0.02146
Eggs and Milk	0.20213	0.02711	0.03995	0.06188		0.07245	0.04373	0.09638	0.12587	0.25445	0.01611
Legumes	0.15887	0.12373	0.07856	0.08391	0.064251		0.05187	0.04719	0.10086	0.08707	0.05211
Fruit & Vegetable	0.12416	0.06429	0.15037	0.01333	0.062749	0.08391		-0.0565	0.20827	0.06059	0.07872
Edible Oil	0.85061	0.06629	0.07202	-0.06358	0.081586	0.04505	-0.03334		0.16212	0.16344	0.02172
Tobacco	-0.04127	0.04485	0.08022	0.08338	0.060831	0.05496	0.07015	0.09256		0.11713	0.01879
Prepared Foods	0.03393	0.03821	0.03672	0.07458	0.053361	0.02059	0.00886	0.04049	0.05083		0.01372
Spices	0.2653	0.0571	0.0608	0.0795	0.0395	0.0513	0.0317	0.0597	0.0207	0.2169	

Table 6.31 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1999 - SUSENAS Micro Data: Urban East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0041	-0.0150	0.0547	0.0171	0.0627	-0.01622	0.0734	0.10105	0.06812	0.00772
Non Rice Staple	0.0372		0.0693	0.2597	-0.0601	0.0011	-0.01936	0.07101	0.24277	0.07448	-0.01875
Fish	-0.0518	0.0261		0.0690	0.0598	0.0273	0.03534	-0.00325	0.15864	0.20951	0.02531
Meat	0.1703	0.0884	0.0622		0.0328	0.0813	0.0489	0.04613	0.07787	0.28329	0.02417
Eggs and Milk	0.0653	-0.0251	0.0661	0.0402		0.0963	0.03967	0.01652	0.17508	0.2907	-0.00966
Legumes	0.2222	0.0004	0.0281	0.0925	0.0894		-0.005	0.17769	0.07633	0.06021	0.05638
Fruit & Vegetable	-0.0813	-0.0106	0.0513	0.0787	0.0521	-0.0071		0.0266	0.14992	0.13724	0.02184
Edible Oil	0.3170	0.0335	-0.0041	0.0639	0.0187	0.2164	0.02291		0.26555	0.16757	-0.01717
Tobacco	0.1862	0.0489	0.0846	0.0460	0.0845	0.0397	0.05509	0.11329		0.14755	0.02666
Prepared Foods	0.0458	0.0055	0.0408	0.0611	0.0512	0.0114	0.01841	0.02609	0.05385		0.00577
Spices	0.2064	0.0190	0.0600	0.0700	0.0481	0.0618	0.0399	0.0480	0.1102	0.3041	

Table 6.32 Compensated Cross Price Elasticities
Derived from the LA/AIDS Model for Food
Based on the 1999 - SUSENAS Micro Data: Rural East Java, Indonesia

MODEL -U93	RICE	N.RICE S.	FISH	MEAT	EG & MILK	LEGUMES	FRUIT-VEG	E. OIL	TOBACCO	PRE.FOOD	SPICES
Rice		0.0005	0.0045	0.1090	0.0194	0.0247	0.0107	0.1897	0.0813	0.0022	0.0001
Non Rice Staple	0.0018		0.0400	0.0594	0.0212	0.0924	0.0276	0.1062	0.0952	0.1050	0.0244
Fish	0.0206	0.0528		-0.0218	0.0313	0.0947	0.0169	0.0780	0.1016	0.1465	0.0450
Meat	0.3523	0.0548	-0.0153		0.0666	0.0810	0.0613	0.0256	0.0907	0.1752	0.0095
Eggs and Milk	0.1091	0.0341	0.0381	0.1157		0.0604	0.0326	0.0831	0.1040	0.2507	0.0156
Legumes	0.1109	0.1186	0.0920	0.1126	0.0482		0.0085	0.1379	0.0864	0.0323	0.0177
Fruit & Vegetable	0.0679	0.0500	0.0232	0.1204	0.0368	0.0120		-0.0212	0.1439	0.0948	0.0312
Edible Oil	0.7995	0.1279	0.0710	0.0334	0.0623	0.1294	-0.0141		0.0983	0.1961	0.0396
Tobacco	0.2233	0.0747	0.0603	0.0771	0.0508	0.0528	0.0622	0.0641		0.2423	0.0303
Prepared Foods	0.0022	0.0301	0.0318	0.0545	0.0448	0.0072	0.0150	0.0468	0.0886		0.0104
Spices	0.2434	0.0698	0.0509	0.0787	0.0395	0.0495	0.0402	0.0607	0.0903	0.2359	

6.5 Expenditure Elasticities

Expenditure elasticities on food groups were calculated at sample mean. The results were presented in Table 6.33. In this table each of food group was cross tabulated across income groups and areas. The point estimates imply that increased expenditure on food by one per cent per household per week was associated with an increase of budget share indicated by elasticity coefficient of each food group. The coefficient estimates of total food expenditure lent support for a strong income or wealth effect on changing budget share. This finding reinforces the view of the World Bank saying that raising income as the critical factor in improving food and health status in poor countries.

As can be followed in the table, some food groups indicated a clear type of expenditure elasticity, while the other groups were found to have a mixed one. In this group were

1. Rice, meat, edible oil, egg and milk, and legume which tended to belong to necessities, irrespective of the income groups and, survey periods, and survey areas;
2. Tobacco and prepared food were luxurious.
3. The rest of food groups, i.e., fish, non-rice staple, fruits and vegetables, and spices, are found to have mixed expenditure elasticities depends on income groups, survey periods, and survey areas.

It is our interest, to know how the expenditure elasticities of each food groups change over the time of survey, across space and income groups: Is there any pattern to follow? One by one food group observations indicated that it is hard to draw a unique pattern. However, we have tried to group the pattern according to a variation over time, across income group and across areas.

Table 6.33 Expenditure Elasticities of Food Demand
Across areas and Income Groups
Based on the SUSENAS Data: 1990, 1993, 1996 and 1999 East Java, Indonesia

FOOD GROUPS		RURAL AREA			URBAN AREA		
		Income Groups			Income Groups		
		Lower	Middle	Higher	Lower	Middle	Higher
Rice	1990	0.3985	-0.3295	0.5553	0.3969	0.6602	0.5377
	1993	0.4630	0.6397	0.6250	0.4215	0.5797	0.4983
	1996	0.6036	0.6389	0.7242	0.5833	0.8985	0.6462
	1999	0.6166	0.4990	0.7255	0.7191	0.8188	0.7399
Non Rice Staple	1990	1.5311	4.3742	1.3932	1.5541	1.9894	1.1514
	1993	1.5567	2.4509	1.2062	1.1200	1.1952	0.8906
	1996	0.8428	0.8224	0.7507	0.9818	1.0262	0.9615
	1999	1.5184	2.2216	1.0799	0.6154	1.0729	0.8315
Fish	1990	1.3501	2.1696	1.2394	0.8699	0.4002	0.7300
	1993	1.2608	1.5033	1.1071	0.8640	0.8797	0.6900
	1996	1.0309	1.1369	0.7809	0.8804	0.5654	0.9090
	1999	0.9823	0.9228	0.9582	0.6977	0.5647	0.7654
Meat	1990	0.8537	-0.0807	0.5661	0.9794	0.1568	0.6324
	1993	0.7762	0.4386	0.6679	0.6939	0.4007	0.6797
	1996	0.9049	0.5533	0.6132	0.8804	0.5654	0.9090
	1999	0.8834	0.4718	0.6858	0.7959	0.3726	0.5301
Eggs and Milks	1990	0.8928	0.5610	0.8619	1.1148	-0.2309	1.5522
	1993	0.9321	0.5382	0.9536	1.0797	0.7833	1.2753
	1996	0.9329	0.6066	0.9464	0.9733	0.5177	1.2181
	1999	0.9057	0.5273	0.6138	0.7433	0.5572	0.5182
Legume	1990	0.9679	0.3770	0.8837	0.9141	0.0288	1.3180
	1993	0.9595	0.8181	0.9493	0.8029	0.6273	0.8345
	1996	0.9984	1.0735	0.9905	0.8733	1.1001	0.9232
	1999	0.9383	0.8432	0.9043	0.8980	0.9719	0.9711
Fruits and Vegetables	1990	2.0028	1.0565	1.6053	1.6985	1.9817	1.7858
	1993	1.6015	1.1900	1.5857	1.4438	1.1565	1.2685
	1996	1.3548	0.4919	1.3413	0.8733	1.1001	0.9232
	1999	1.1068	0.6629	1.0049	0.9238	0.8801	0.9094
Edible Oil	1990	0.8694	1.1383	0.9144	0.9062	0.2821	0.9611
	1993	0.7793	0.7372	0.8335	0.7047	0.8381	0.7745
	1996	0.7365	0.5061	0.7151	0.7840	0.9584	0.8222
	1999	0.5869	0.5618	0.7136	0.7336	0.7914	0.7771
Tobacco	1990	1.3665	1.1735	1.0992	1.3210	1.5230	1.0030
	1993	1.4305	1.1702	1.2550	1.4733	1.4660	1.0917
	1996	1.3846	1.3187	1.1779	1.2563	1.1015	1.1242
	1999	1.4441	1.9316	1.6382	1.4590	1.9513	1.4986
Prepared Foods	1990	1.3115	1.6262	1.5579	1.4109	1.9341	1.4018
	1993	1.2594	1.2015	1.3402	1.4051	1.4426	1.5320
	1996	1.4093	1.7066	1.5607	1.3617	1.6383	1.3909
	1999	1.2367	1.2844	1.2904	1.2917	1.1352	1.2989
Spices	1990	1.4005	2.0695	1.2445	1.3468	1.9463	1.0975
	1993	1.2865	1.1863	1.0808	0.7817	0.8390	1.3913
	1996	0.9677	1.2033	0.9420	0.7470	0.9195	0.7545
	1999	0.9207	0.8833	0.9390	0.6125	0.8190	0.6775

- ***Variation over Time***

The following pattern is identified:

1. Patter A: Expenditure elasticities rise over time of survey.

   In rural area, food group following this patter is rice in lower and higher income groups. Those belong to the middle income group did not follow this pattern.

   In urban area, this pattern was found among households of lower income group.

2. Pattern B: Expenditure elasticities decline over time of survey.

   In rural area, food groups for which the expenditure elasticities performed this pattern are fish in lower and middle income groups, meat in lower income group, Eggs and Milk in middle income group, "fruits and vegetables" and "edible oil" in lower and higher income, and spices in all of income groups.

   In urban area, food groups for which the expenditure elasticities follows this pattern are eggs and milk in lower and higher income groups, fruits and vegetables in middle and higher income groups, edible oil in lower income group, prepared foods in lower income group, and spices in all income groups.

3. Pattern C: the expenditure elasticities first decline and then rise:

   In rural area: food groups for which the expenditure elasticities performed this pattern are non-rice staple in all income groups, fish in higher income group,

   In urban area, the food group for which the expenditure elasticities follow this pattern is non-rice staple in middle income group.

4. Pattern D: the expenditure elasticities first rise and the decline.

   In rural area: food groups for which the expenditure elasticities performed this pattern are legume in middle income groups, meat in middle income group;

   In urban area, food groups for which the expenditure elasticities follow this pattern are legume in middle income group, edible oil in middle income group.

- ***Variation across Income Groups***

A similar pattern is performed across income groups. The pattern of expenditure elasticities might be characterized as:

1. Pattern A: expenditure elasticities rise across income groups.

   In rural area: only rice in 1996 performs this pattern of development.

   In urban area: only spice in 1993 performs this pattern of development.

2. Pattern B: expenditure elasticities decline across income groups:

   In rural area: non-rice staples in 1996 and prepared food in 1999 perform this pattern of development.

   In urban area: eggs and milk in 1999, tobacco in 1993, and prepared foods in 1993 perform this pattern of development.

3. Pattern C: expenditure elasticities fall and then rise, as income group moves from the lower, middle to the higher.

   In rural area, expenditure elasticities with this pattern were found in food groups of meat, egg and milk, Legume in 1990, 1996 and 1999, fruits and vegetables, tobacco in 1993 and 1996.

   In urban area, those to which expenditure elasticities performed this pattern are, fish in 1990, 1996, and 1999, meat in all years, Eggs and milk in 1990 to 1996, legume in 1990 and 1993, fruits and vegetables in 1993 and 1999.

4. Pattern D: expenditure elasticities rise, and then fall, as income group move from the lower, middle to the higher group.

   In rural area, food groups of which the expenditure elasticities followed this pattern are rice, in 1993, fish in 1990, 1993, 1996, Legume in 1996, Tobacco, in 1999, prepared food in 1990 and 1996, and spice in 1990 and 1996.

   In urban area, food groups of which the expenditure elasticities revealed this pattern are, rice in all years of survey, non-rice staple, in all years of survey, fish in 1993, legume in 1996, Edible oil in 1993 and 1996, tobacco in 1990 and 1999, prepared food in 1990 and 1999, and spices in 1990, 1996 and 1999.

The other pattern, namely a steady increase, a steady decrease are also performed but not so frequent.

What we could delineate from observing the pattern is that the development in expenditure elasticities is not regular. There is no grand pattern representing a large section of the observation units.

This irregularity in the pattern may be explained in term of both quantitative and qualitative changes in the household consumption baskets. For a given, quality of a commodity, the immediate concern of household is to consume that commodity up to a certain minimum desired level. If the households are not consuming the preferred commodity in the desired

minimum amount then expenditure on that commodity increases with an increase in the level of income. Once households have achieved that desired level, given the quality of commodity, the expenditure share of that commodity in total household expenditure declines as income increases. However, as income continue to increase, households may switch to better quality of the commodity and thus expenditure on the commodity starts to increase again. This pattern is repeated as incomes continue to increase even further. In other words, as long as there are various qualities available in the market, the irregularity will exist.

Pattern A in which expenditure elasticities rise along the increase of income level may represent a situation in which the households did not consume the goods in the desired minimum amount. For a ggiven quality, the household desire to first consume a minimum amount of good. As long as this desired minimum amount of good is not yet achieved, the expenditure elasticity will rise as income level of the household increases. The reflection is increasing expenditure elasticity across income level.

Pattern B, the decreasing expenditure elasticity, may represent a well-known Engel's Law. The household in this situation starts to consume the food good in the desired minimum amount, for a given quality. As the income level increases, the expenditure elasticity on that food decreases.

Pattern C, in which expenditure elasticity first falls and then rises, as income group moves to a higher level, may represent a situation, in which a household has started consuming food good at minimum amount. So it started first to reduce the consumption of food good of a given quality. Therefore, the expenditure elasticity declines. As the income level further rises, the household switchs to the food group of higher quality

Based on the above estimates assessment, we suggest that households in different income groups performed different patterns and that in general, they alter their consumption bundles both quantitatively and qualitatively in response to changes in income.

6.6 Family Size Elasticity

"Family" includes the members of the household who normally ate from the same kitchen (sharing the same pot). The family size thus, the number of those who normally (almost every day) eat from household's common kitchen. As in this study the size is measured only by the number, irrespective of age and gender of the member, it is implicitly assumed that the individual member in the household has an equal demographical character. This approach may be a crude one.

In the literature (Brown and Deaton, 1972; Deaton and Muellbauer, 1980a), one introduces what is called adult equivalent scale or the similar scale to take into account the variations in demographic aspects of family member (mostly age and sex). Because of statistical problems in estimation and availability of data, however, few studies have attempted to estimate the demand function with adult equivalent scales.

Prais and Houthaker (1955) emphasized the need of including family size in the specification of demand function on the grounds that households' total expenditure and household size are positively correlated and exclusion of the latter may bias the results. In addition, variations in household size have comparatively larger effects on the consumption of certain commodities than variations in the total expenditure. For a given expenditure, larger households tend to spend a higher proportion of their total expenditure on staple food compared to smaller households.

The coefficient of household size captures the effect of economies of scale in consumption among larger households. According to Houthakker (1957), the coefficient of household size represents two effects determining demand, namely, the *specific effect* and the *income effect*. The first effect might be related to the need of diversifying commodities, as the size of family i

The income effect refers to a reducing real purchasing power household as family size increases. If *specific effect* is dominating the *income effect*, the gross effect of increasing family size is positive. Otherwise, the effect will be negative.

Table 6.34 reports the estimation result of the elasticities of eleven food groups from the LA/AIDS model with respect to household size.

The performance of demand elasticities with respect to household's size may be grouped into four categories.

7. positive elastic:
8. positive inelastic
9. negative elastic
10. negative inelastic

Table 6.34 Demand Elasticities of Food Items on Household Size Estimated from the LA/AIDS Model Based on the 1990 –SUSENAS Data, Urban East Java, Indonesia

MODEL	RURAL AREAS				URBAN AREAS			
	1990	1993	1996	1999	1990	1993	1996	1999
Rice	0.6137	0.9884	0.7077	0.6118	1.2113	1.2464	0.9732	0.6766
Non Rice Staple	0.8741	0.2032	0.7565	0.3131	-0.0837	0.0359	0.1104	0.6854
Fish	-0.1752	-0.2610	0.1900	0.0696	0.1319	0.3152	0.0125	0.3055
Meat	0.0702	0.2557	0.1604	0.1213	-0.1831	0.2806	0.0985	0.3527
Eggs and Milk	-0.0955	-0.1977	-0.1422	0.1485	-1.1515	-0.5039	-0.4378	0.3961
Legumes	-0.2965	-0.2105	-0.1159	-0.1192	-0.5626	0.2374	0.2261	0.0614
Fruit & Vegetable	-1.6481	-1.2125	-1.0404	-0.4007	-1.2943	-0.8529	-0.6866	-0.0846
Edible Oil	0.0920	0.1079	0.1861	0.3298	-0.1552	0.2901	0.2974	0.3277
Tobacco	-0.6349	-0.8030	-0.6322	-0.7815	-0.3907	-0.5046	-0.4235	-0.5292
Prepared Foods	-0.6277	-0.5695	-0.7180	-0.4768	-0.5540	-0.7978	-0.5174	-0.5859
Spice	-0.0866	-0.1971	0.1238	0.0505	0.0083	-0.1748	0.3047	0.4403

Elasticities variation over time of each food groups is shown in the following pattern.

In rural area:

(i) There is no food group performing category 1, positive elastic;

(ii) Rice, non-rice staple, meat, edible oil, overall years of survey, fish in 1996 and 1999, spices in 1996 and 1999, performed the second category of household 's elasticity: positive inelastic;

(iii) Category 3 of household's elasticity (negative elastic) is performed by food group fruits and vegetables;

(iv) Otherwise: fish in 1990, 1993, eggs and milk in 1990, 1993, 1996, legume, tobacco prepared foods, and spices in 1990, 1993, performed negative inelastic.

In Urban area:

(i) Rice revealed a positive elastic household's size elasticities in 1990 and 1993.

(ii) Non rice staple, in 1993, 1996, 1999, fish in all periods of survey, meat, legume, edible oil, in 1993, 1996, 1999, exhibited positive inelastic;

(iii) Eggs and Milks in 1990, Fruits and Vegetables, in 1990, exhibited a negative elastic household's elasticity.

(iv) Otherwise: non rice staple, in 1990, meat in 1990, eggs and milk, fruits and vegetables, tobacco, prepared food and spices in 1993, these groups exhibited negative inelastic.

These patterns indicate that for rice, non-rice staple, meat, edible oil, fish, spices, both in rural or urban areas, *the specific effects* was dominating the *income effects*. Since, the magnitudes were less than unity, it follows, and that for these food goods *economic of scale* was there, as the number of household's member increases. Varying magnitudes of household's size elasticities over periods of survey may also suggest that the degree of economic of scale in consumption are not only different across commodities but may also be different over time.

For food goods with a negative inelastic elasticity of household's size, such as Eggs and Milks in 1990, Fruits and Vegetables, in 1990 etc., this implies that an increase in family size, holding price and income unchanged, makes the family poorer, meaning that reallocating the expenditure for additional necessities, cannot but spend less on these food goods.

CHAPTER 7. POLICY EXERCISE

This chapter is specified to demonstrate the usefulness of demand study for policy analysis. Parameter estimates derived from the demand system may be treated into a simulated scenario to answer policy issues under investigation. There are four ways for demand study to address policy issues (Rauniker and Huang, 1987). The first is by providing a demand system specified for a certain policy issues. The second is by adaptation of the estimated demand model, to permit development of an empirical framework so the policy issue can be addressed. The third is by providing elasticities matrix to answer issues related with quantity dependent perspective. The fourth is by providing flexibility matrix for a price dependent issue. The policy assessment in this chapter follows the second type.

The policy issues and corresponding policy instruments are numerous, but one which is relevant to this study is pricing policy. Price change introduced via government intervention may affect wellbeing of private households. This may be beneficial or adverse. To know how this works, one needs to measure and assess this welfare change. Estimation results of empirical study may help to answer typical questions commonly addressed in welfare analysis i.e. Given price policy, who is the gainer, the looser and how big is the magnitude of gain or loss? In what follows the above question was addressed.

7.1 Background

The immediate impact of economic crisis on Indonesia's food and agricultural sector is the fast market liberalization of the *strategic* commodities like wheat, cooking oil, sugar, soybean, cloves. This deregulation is an unavoidable choice because of

(1) concern on budget of central authority,

(2) Indonesia's economic commitment with lending institutions (*the letter of Intent*) and trading partner countries -bilateral as well as multilateral, mainly in the frame of WTO, AFTA and ASEAN,

(3) Consumerism movement, i.e. domestic nongovernmental movements demanding a liberalization of domestic market from protection and monopoly, which rises along with an increasing degree of democratization and freedom to organize in the country.

Previously, import licensing, tariffs, export regulation (ban, tax, and licensing control) were typical policy instruments in international trade of this country. Administered price system for some food commodities combined with its marketing monopoly is instruments typically applied for domestic food market.

Due to *letter of Intent*, these all have been deregulated in favor of free market mechanism, except for rice, - a commodity recognized as being sensitive to the country. Thus, to think of policy intervention that matches this situation, two policy proposals was considered in the scenarios.

7.2 The Scenarios

The proposed policy scenarios are designed to represent the situation as realistic as possible. However, their nature is illustrative; the scenarios are not representing the government position. These scenarios are forseen and are deemed compatible with the existing intervention space available for the government under the existing political framewoks.

Three pricing policy scenarios are considered to be implemented in this exercise. The objective is to see how these scenarios affect the purchasing power of households. It must be noted

Scenario 1

The government phases out the import duty for rice that leads to a decrease of rice price by 30 per cent.

Import tariff by this moment is the only intervention that can be exercised by the government of Indonesia, in accordance with WTO agreement and the *letter of Intent*. If the import duty on rice is eliminated the market prices of rice is expected to decrease to match the competitive equilibrium prices. According to some studies (Choudori, 2000) the fall of rice price may range from 20 per cent to 40 per cent, due to the tariff elimination. In this exercise, we considered to place a percentage of 30-price reduction as a result of it.

Scenario 2

This is a combination of imposition of a new tobacco tax and an elimination of the import duty on rice, which induce the price decrease of 30 per cent. Imposition of tobacco tax

maybe called a "sin" tax policy, in which government justifies this policy on the argument that tobacco and related products (cigarettes, cigar, etc.) are "sin" luxurious goods. Its budget share is relatively big (see Table 7.1). Many proofs indicated the danger of tobacco products on human health. But infectivity of law enforcement failed to protect non-smokers from the danger of negative externalities of smoking. Imposition of tax on tobacco is considered as a way to reduce its consumption, to increase government revenue, and to facilitate a healthy environment. Re-allocation of this budget share to other food groups or may contribute a better diet and health. This may justify the imposition.

In this exercise the tobacco tax is assumed to induce a price increase of 40 per cent, *ceteris paribus.*

Scenario 3

The policy makers impose simultaneously a 50 % import duty on rice and imposition of tobacco tax. The imposition of 50 % represents a contra situation from market liberalism as a result of some reasons: (i) there is an increasing movement advocating for rice farmers to get protection from global market. (ii) There is still a room for this imposition as far as rice concerned. In the World Trade Organization agreement, Indonesia is actually allowed to impose the tariff level of 110 per cent until 2003. According to the agreement on Indonesia, from 2004 to 2010 the tariff may be maintained to 95 %. Also, with some conditions the imposition is still possible. So imposing of more 50 per cent than the old tariff level on rice is possible to occur given a domestic political situation.

Reference situation

1. The year of reference is 1999, meaning that the household's food consumption behavior of rural and urban East Java is represented by the estimated AIDS model of the year 1999.
2. The equilibrium level of domestic rice price is determined under influence of ceiling price instrument and import duty of 30 per cent of world price.
3. Domestic market for all other food commodities is liberalized. So the domestic price level is determined by the supply and demand at the border. The level follows the world's price equilibrium.

4. As the base line, the household budget share on food groups of the reference situation is presented in table 7.1.

Table 7.1 the Weekly Average of the Household's Budget Share on Food Groups Across Income Groups and Areas: The Observed Data 1999 - East Java, Indonesia

FOOD GROUPS	URBAN AREA			RURAL AREA		
	Income Groups			Income Groups		
	Lower	Middle	Higher	Lower	Middle	Higher
Rice	0.23	0.21	0.17	0.25	0.25	0.22
Non Rice Staple	0.03	0.02	0.02	0.09	0.07	0.05
Fish	0.05	0.06	0.07	0.05	0.05	0.06
Meat	0.06	0.06	0.07	0.07	0.08	0.08
Eggs and Milk	0.05	0.05	0.06	0.04	0.04	0.05
Legumes	0.06	0.06	0.05	0.05	0.05	0.06
Fruits and Vegetables	0.04	0.04	0.05	0.04	0.04	0.04
Edible oils and Fat	0.05	0.05	0.04	0.06	0.06	0.05
Tobacco and Betel	0.10	0.12	0.12	0.08	0.09	0.10
Prepared Food	0.30	0.30	0.32	0.24	0.24	0.26
Spices	0.03	0.03	0.02	0.03	0.03	0.03

Source: *Own Calculation based on the SUSENAS data: East Java, 1999.*

7.3 Welfare Measurement Revisited

Expenditure function or cost function is a natural way for measuring welfare change. If the cost of affording a bundle of food goods for someone changes, then changes also the wellbeing of him/her. A relevant question to that is “how much money do we need (or can we afford to give up) in order to get back to the reference level of wellbeing?”

As already discussed in two previous chapters, some approaches are available for evaluating welfare effects of any policy regime based on demand study. Three of them are consumer surplus, compensating variation, equivalent variation, and living index. In this exercise compensating variation concept is used as a tool of our analysis.

Compensating Variation (CV)

If p_0 is the initial reference situation and p_1 is the final one, and W or C (u^0_i, p_i^0) is the minimum (maximum) amount of money that has to be given to (taken away from) an individual to make them as well off as before the price rise (fall).

Rewriting **(5.22**) compensating variation is expressed as

$$CV_i = c(u_i^0, p_i^1) - c(u_i^0, p_i^0) \quad \textbf{(7.1)}$$

$$= c(u_i^0, p_i^1) - c(u_i^1, p_i^1)$$

This is a welfare cost of price change from the reference situation to the final one. Because compensating variation is money metric, its expression is dependent on an absolute expression in term of country's currency unite. This is less comparative. To avoid this, one can transform it in relative term, by using for example, price index, which is metric free. So (7.1) can be expressed algebraically in term of price index as

$$\frac{C(p_i^1, u_i^0)}{C(p_i^0, U_i^0)} = \frac{C(p_i^1, u_i^0)}{C(p_i^1, U_i^1)} \quad (7.2)$$

In this transformation, welfare change took place by households is interpreted as a changing purchasing power. Because the level of utility is not observable, the price index is approximated[17]. To approximate the price index we applied Fischer Ideal Price Index, which is a geometric means of Laspeyres- (P*L*) price index

$$P_L = \sum_i w_i^0 \frac{p_1}{P_0}$$

and the Paasche (P*P*) price index

$$P_p = 1 / \left(\sum_i w_i^1 \frac{p_0}{P_1} \right).$$

So, Fischer ideal price index is = $\sqrt{P_L}.P_P$,

where

w^0_i = Budget share at preference condition based on observed data. For the calculation, this share is represented by mean value of observed data.

w^1_i = food group's budget share after price change to be estimated from the AIDS model.

[17] See further Deaton and Muellbauer (1980a) in Grings (p.128)

The ideal Fischer Ideal Index = ($\sqrt{P_L}.P_P$,) represents a changing purchasing power as an approximation of welfare change.

7.4 The Welfare Effects of the Scenarios

Table 7.2 and 7.3 present the estimated welfare change of the policy scenarios in term of price indices. The price index lower than 100 indicates a cheaper price, and thus a welfare gain for the Households well being. The index 100 indicates an unchanged well being. Otherwise, it indicates a welfare loss for corresponding households. Based on these indices, it can be assessed as follows.

Scenario 1

1. The elimination of import duty on the imported rice has relatively similar welfare effects across different income groups of household in rural as well as urban areas, both in the direction and magnitude of change. That is, it will increase the purchasing power of all households across income groups and areas with an increase ranging from 10 per cent (by the rural households in the higher income group) to 19 per cent (by the rural households in the middle-income group). By referring to table 7.1, it appears that the magnitude of welfare impact on the households correlates with the budget share of the corresponding food group at the base line situation. For example, the rural households in the middle-income group have a weekly average of budget share on rice as much as 25 per cent, the biggest budget share among the observed household groups. The welfare effect corresponding to the scenario 1 on those of this group is the highest, namely, 19 per cent gain of purchasing power. Since the household with the higher income consumes rice less percentage of their food budget, the impact on them is also less.
2. A comparison between the urban and the rural areas gives no conclusive picture with respect of the welfare effect induced by this scenario. Among the higher income households, the gain from this policy scenario is greater in rural area than that of urban area. Meanwhile for those belong to the lower and the middle income groups the gain is higher in rural than in urban areas The difference of the welfare effect among income

groups is more extremely seen in the rural area, than in the urban. In all, an elimination of duty on imported rice brings about gain to households.

3. While the effect is positive for the households, this policy however, will likely be objective by rice farmers, the likely looser of this policy. But, if this policy is accompanied by a well managed direct or indirect income transfer to the farmers to protect them from declining rice price, this combination of policy may be beneficial for all. Compared to the current general support price (which tends to create an urban bias), a well managed income transfer may be less costly to the government in term of fiscal burden. Income transfer to the farmers, though previously not commonly implemented, is at the moment being thought of as an alternative measure, especially to mitigate the crisis impact on the farmers. Thus, its implementation is likely allowable and accepted by domestic politicians.

Scenario 2:

1. Tables 7.2 and 7.3 exhibits gains of purchasing power for all income groups. It is exhibited that the urban households gain better than their counterparts in the rural. This may be caused by the fact that the budget shares for tobacco and betel of those who are in urban area are larger than the budget share of tobacco and betel of those who are in rural area.
2. Compared to the welfare change induced by the scenario 1, the welfare change induced by this scenario is not obviously different. At the other side, this scenario may bring revenue to the government. So, besides the gain enjoyed by consumers, this scenario bring also gain to the government. The elimination import duty and imposition of "sin tax" for tobacco and betel group brings mostly gain, with small loss suffered by households. Thus, it may be a good policy option to implement.

Scenario 3

For this scenario, welfare change exhibits losses for most of households across income groups and areas. The highest loss is suffered by households of rural- low income group, urban-low income group, and rural middle income group who should afford 19 %, 15 % and 14% more budget respectively for them to stay at the same well being as before the

imposition. It is shown, that the imposition of the tobacco tax does not help much, at least from the perspective of consumer households.

6 Concluding Words

It is shown that demand estimates derived from the LA/AIDS model in combination with price index concept may be used to measure a welfare change of pricing policy option. The results are useful for policy makers, policy analyst and consumer interests. Three policy scenarios exercised in this assessment are,

1. the elimination of duty on imported rice leading to a decrease of rice price by 30 per cent,
2. the above option is combined with the imposition of tobacco's "sin tax" that lead to rice price decrease by 30 per cent and an increase of tobacco and betel price by 40 per cent,
3. The imposition of import duty on imported rice combined with an imposition of tobacco's "sin tax" that lead to 40 per cent price increase.

If the first scenario is implemented all private households across the income groups and areas may receive benefits from the decreased market price of rice.

If the second scenario is implemented most of households gain benefits. Households in urban area will benefit better than those in rural area.

If the combination of import duty and the tobacco tax is implemented the larger loss of purchasing power will incur to the household from lower income group in rural area.

7 Notice

In this assessment, the demand models of different income groups are assumed to have the same pattern of consumption, as they are represented only by one model. This may be misleading, because each income group might have a unique consumption behavior that requires a different treatment for each. However, this results support the proposition, that tarification for households to pay more for the same good of the same quality.

CHAPTER 8. CONCLUSIONS

The descriptive statistics, the results of estimation and their corresponding discussions has lead to the following conclusions:

1. The demand systems that we specified and estimated take the form of budget share of eleven food group as being independent on the own price and ten prices of other food groups in this system, the total expenditure on food, income groups where the household belongs, and the number of household's member (household size) of each household. The eleven food groups are the groups of rice, non-rice staples, fish, meat, eggs and milk, legumes, Fruits and Vegetables, Edible Oils, tobacco and betel, prepared food, and spices and miscellaneous. Rice has the highest share of total food expenditure.
2. As clearly shown in the model, the price which was taken out from the cross sectional data could sufficiently estimate the coefficients necessary for computing the price elasticities of demand.
3. Estimated own price elasticities for the LA/AIDS model based on micro data suggest that food groups, with exception on the edible oil and Eggs and Milks, are generally price inelastic. All estimated own price elasticities are negative. The difference in magnitudes between the Hicksian compensated own price elasticities and that of ordinary own price elasticities suggest the presence of income effects in each of price change. The existence of cross price elasticities confirmed that the demand for food commodities is responsive to the relative prices change. The response is however weak. These cross price elasticities are lower compare with own price elasticities. Thus, consumer demand for particular food groups in general were more sensitive to the change in own price than other prices. The cross effect of rice price to the other food groups are in general bigger than otherwise. This again suggests the prevalence of rice as a centre food commodity in Indonesia.
4. The coefficient estimates of total food expenditure lent support for a strong income or wealth effect on changing budget share. This finding reinforces the view that raising income, instead of just a pricing policy as the critical instrument in the improvement of food and health status in poor countries. Across commodity, one may draw a pattern

that includes rice, meat, edible oil, egg and milk, and legume into a one group of necessities, irrespective of the income groups, survey periods, and survey areas. Tobacco and prepared food tended to be luxurious. The rest of food groups, i.e., fish, non rice staple, fruits and vegetables, and spices, have in general a mixed expenditure elasticitities, depends on the income groups, survey periods, and survey areas. More general indications are that there is no general systematic pattern. This irregularity in expenditure elasticities may be due to the effects of quality changes in consumer's spending.

5. As evident from the signs of the elasticities estimates, household size has positive effects for rice and non rice staples and edible oil, and negative effects on most other food groups. So, food consumption for households of with big family member consumes merely carbohydrate rich diets.
6. As indicated in the last chapter, the use of results from this study for policy analysis has shown a reasonable result. Furthermore, by application of micro data in demand models, the economic view is widened and the frame work of micro analysis is maintained.
7. As this study did not employed exhaustively the existing methods available for study like this type, we cannot compare directly which methods conveys the most reliable results. Therefore, the estimates should be used with caution and are perhaps best regarded as providing orders of magnitudes.

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