AN EMPIRICAL ANALYSIS OF MEAT DEMAND SYSTEM MODELS IN PENINSULAR MALAYSIA

By

ABDULLAHI FARAH AHMED

Thesis Submitted to School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Doctor of Philosophy

November 2006

THIS DISSERTATION IS DEDICATED TO MY BELOVED PARENTS:
FARAH AHMED YUSUF AND
AWRALA SAMATAR OSMAN

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

AN EMPIRICAL ANALYSIS OF MEAT DEMAND SYSTEM MODELS IN PENINSULAR MALAYSIA

By

ABDULLAHI FARAH AHMED

November 2006

Chairman : Associate Professor Zainal Abidin Mohamed, PhD

Faculty : Agriculture

The trend of meat consumption in Malaysia has shown a significant growth since early 1970's. Total amount of meat per capita consumed has grown 57.3% from 1990 to 2003. Poultry and pork have been the dominant meats consumed in Peninsular Malaysia. However, the highest growths were chicken and beef, which have increased 99.15% and 57% from 1990 to 2003 respectively, while the consumption of pork per capita declined 22.3 %. Among the factors cited for this meat consumption growth were the consequences of economic development and associated changes in dietary patterns, taste and preferences in the country. Other reports indicated that the greater part of these changes had been due to consumer income growth and price effects besides high population growth. These spectacular changes make the answers to meat demand estimates in

Malaysia more complex. Thus, empirical analysis employing the systems approach is used in this study.

This study is motivated by two aspects. First, various authors have estimated demand of meat in Malaysia in the past and most of these estimations date back to before 1990s. The elasticities obtained from that estimates cannot be used for predictions since many structural changes have occurred in Malaysia since that time. Second, most of studies conducted in Malaysia have focused on estimation of and explanation on structural parameters in using one demand model. Very limited or no attention has been paid to compare among different demand models. Therefore we are interested to know if there are differences in the performance among demand models and choose the appropriate one that could fit in Malaysia data. Finally, we are interested to carriy out a test to identify any structural changes following the discovery of Nipah virus (NV) in Peninsular Malaysia and also to determine if changing the taste and preferences of consumer due to income growth has caused significant changes in the structure of meat demand in Malaysia.

The main objective of the study was to select the best functional form specification in empirical meat demand research in Malaysia. This is carried out through the comparison of three different demand system models, which are: Rotterdam Demand System (RT), Linear Almost Ideal Demand System (LAIDS)

and Almost Ideal Demand System with Error Correction Model (LAIDS-ECM) by utilizing Peninsular Malaysia's per capita beef, mutton, chicken, pork and fish consumption and their retailed prices from 1960 to 2003. The second objective is to analyze the impact NV and trend on consumer demand for meat.

Two criteria were used to select the model that better explain the observed Peninsular Malaysia beef, mutton, poultry and fish consumption patterns. First, we conducted non-nested tests designed to test the functional forms of the three demand models for using the likelihood ratio test. Second the mean square errors (MSE) for beef, mutton, pork, fish and poultry per capita consumption for each model were compared. All models were subjected the McGuire *et al. (*1995) system misspecification testing procedure to ensure that they were statistically adequate. Misspecification tests including normality, Functional form, endogeneity, correlations, demand restrictions, joint conditional mean and joint conditional variance tests were conducted.

The study found that the LAIDS model is the preferred demand model for Malaysian data compared to the Rotterdam Demand System and LAIDS-ECM. This was confirmed by both non-nested model test and forecast accuracy. We proceeded the estimation of the price and expenditure elesticities for all models in order to see weather they had any differences in the behavior. The expenditure elasticities were not very different among the selected models

ranging from 0.486 to 1.248. The highest expenditure elasticity corresponds to fish from the LAIDS-ECM. In addition, the LAIDS and Rotterdam have almost similar expenditure elasticities although the Rotterdam model has more elastic expenditure for beef and fish. For LAIDS and LAIDS-ECM models the gap is higher, for example, the elasticity for chicken from the LAIDS is 0.74, indicating chicken as a normal good, whereas that from the LAIDS-ECM model is 1.056 showing unit elastic demand. This conflict behavior can be explained in short term that the consumption of chicken is elastic as shown the results of the LAIDS-ECM, which represent the short-term changes in consumer's consumption trend, but in long-run, it seems to be normal goods as LAIDS model predicted.

Net of expenditure effects, mutton is more sensitive to own price changes in comparison to any of the other three meat products. Using the cross price elasticities, there is little substitutability between fish and the other three meat products, while beef shows the highest degrees of substitutability with the other products. This finding implies that the price policies for meats are not too sensitive for consumer at least in short term period.

We also found that there is structural break in meat demand in Malaysia. The tests of structural change indicated that trend and Nipah Virus did impact Malaysian meat consumption. The result of the study indicates that Malaysian

consumers reacted negatively to pork meat, while positively reacted to poultry, beef and mutton during and after crisis. This reaction accounted for the decrease in consumption of pork that resulted in lower expenditure and own-price elasticities for pork after the crisis. A negative trend in pork per capita consumption has occurred, while per capita consumption of chicken and beef had increased. This will give a good prospective for the beef and mutton industry, which have strong demand in future. Thus, the beef industry player has every incentive to cultivate and explore the consumers demand as this offer greater potential for growth and increased in future.

Finally, the information presented in this study was intended to complement previous consumer demand researches, providing useful insights about the meat consumption patterns of the growing consumers in the Malaysia. The main contribution of our study on meat demand research formulation is that we compared the three most applied demand models for estimating the effects of income and prices on meat consumption in Peninsular Malaysia. Most previous researches just used only one model to make policy recommendation. We argue that models selection criteria should be considered before implementing the final outcome of demand to evaluate both meat demand and consumer welfare because a comparison of models would be important since different models produce different elasticities which can be used to predict future demand and is critical for guiding domestic production as well as to increase the consumer's

welfare. Therefore our analysis contributes in decision making process for meat policy formulation in Peninsular Malaysia.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

ANALISIS EMPIRIKAL TERHADAP MODEL SISTEM PERMINTAAN DAGING DI SEMENANJUNG MALAYSIA

Oleh

ABDULLAHI FARAH AHMED

November 2006

Pengerusi :Profesor Madya Zainal Abidin Mohamed, PhD

Fakulti :Pertanian

Aliran penggunaan daging di Malaysia telah menunjukkan peningkatan yang signifikan sejak awal tahun 1970. Jumlah penggunaan daging per kapita telah meningkat 57.3% dari tahun 1990 hingga 2003. Ayam dan khinzir merupakan daging yang banyak digunakan di Semenanjung Malaysia. Walau bagaimanapun, daging ayam dan lembu menunjukkan peningkatan yang paling tinggi iaitu sebanyak 99.15% dan 57% dari tahun 1990 hingga 2003, manakala penggunaan daging khinzir berkurangan sebanyak 22.3% per kapita. Antara faktor-faktor yang dinyatakan berikutan peningkatan penggunaan daging adalah pembangunan ekonomi dan perubahan dalam corak pemakanan, rasa dan keutamaan dalam negara. Laporan lain menyatakan bahawa sebahagian

besar dari perubahan-perubahan ini adalah disebabkan oleh peningkatan dalam pendapatan dan harga serta peningkatan dalam populasi. Perubahan ini menyebabkan perubahan yang kompleks dalam anggaran permintaan daging di Malaysia. Oleh itu, analisis menggunakan model sistem permintaan diaplikasikan di dalam kajian ini.

Kajian ini adalah bermotifkan kepada dua aspek. Pertama, pelbagai penulis telah menganggarkan bahawa permintaan daging di Malaysia dalam masa lampau dan kebanyakan penganggaran permintaan untuk daging adalah sebelum tahun 1990. Keanjalan ini tidak boleh digunakan dalam menganggarkan permintaan daging kerana banyak perubahan telah berlaku di Malaysia dalam tempoh masa tersebut. Kedua, kebanyakan kajian yang dikaji di Malaysia memfokuskan kepada penganggaran dan penjelasan dalam struktur parameter yang hanya menggunakan satu model permintaan. Terlalu sedikit atau tiada sebarang kajian yang dilakukan kepada perbandingan di antara banyak model permintaan. Oleh sebab itu, kita berminat untuk jika mengetahui kewujudan perbezaan dalam penggunaan pelbagai jenis model permintaan serta memilih model permintaan yang bersesuaian dengan data di Malaysia. Akhir sekali, kita berminat untuk melakukan ujian untuk mengenalpasti sebarang perubahan struktur berikutan penemuan virus Nipah (NV) di Semenanjung Malaysia dan juga menentukan jika perubahan citarasa dan kecenderungan pengguna berikutan peningkatan

pendapatan telah menyebabkan perubahan yang signikan dalam struktur permintaan daging di Malaysia.

Tujuan utama kajian adalah untuk memilih bentuk fungsian yang terbaik dalam kajian permintaan daging di Malaysia. Ini dilakukan dengan membuat perbandingan di antara tiga jenis model sistem permintaan iaitu Rotterdam Demand System (RT), Linear Almost Ideal Demand System (LAIDS) and Almost Linear Almost Ideal Demand System with Error Correction Model (LAIDS-ECM) dengan menggunakan penggunaan daging lembu, kambing, ayam, khinzir dan ikan per kapita dan harga yang berkaitan di Semenanjung Malaysia dari tahun 1960 hingga 2003.

Dua kriteria telah digunakan untuk memilih model yang terbaik dalam menerangkan corak penggunaan daging lembu, kambing, ayam dan ikan di Semenanjung Malaysia. Pertama, kita melakukan ujian non-nested untuk menguji bentuk fungsian tiga model permintaan dengan menggunakan ujian nisbah kebolehjadian. Kedua, ujian kadaran ralat kuasa min (MSE) untuk penggunaan daging lembu, kambing, khinzir, ikan dan ayam per kapita dibandingkan di antara ketiga-tiga model yang dinyatakan. Kesemua model tersebut adalah daripada McGuire et. al (1995) untuk mengkaji prosedur spesifikasi yang salah dalam memastikan ketepatan secara statistik. Ujian bagi

spesifikasi yang salah merangkumi normaliti, bentuk fungsian, endogeneity, korelasi, halangan permintaan, kabungan min dan kabungan ujian varians.

Kajian mengenalpasti bahawa LAIDS model adalah model yang lebih cenderung digunakan di Malaysia berbanding Rotterdam Demand System dan LAIDS_ECM, Ini dipastikan dengan ujian non-nested model dan model jangkaan ketepatan, Kita melanjutkan penganggaran untuk harga dan keanjalan perbelanjaan untuk kesemua model untuk menentukan sama ada terdapat perbezaan dalam. Keanjalan perbelanjaan tidak menunjukkan perbezaan yang ketara di antara tiga model yang dipilih iaitu dari 0.486 hingga 1.248. Keanjalan perbelanjaan yang tinggi adalah ikan dari model LAIDS-ECM. Tambahan pula, LAIDS dan Rotterdam mempunyai keanjalan perbelanjaan yang hampir sama walaupun perbelanjaan lebih anjal untuk daging lembu dan ikan dari model Rotterdam. Untuk model LAIDS and LAIDS-ECM, perbezaan adalah tinggi, sebagai contoh, keanjalan untuk daging ayam dalam LAIDS adalah 0.74, menunjukkan ia adalah barangan normal, di mana untuk model LAIDS- ECM adalah 1.056 menunjukkan permintaan keanjalan seunit. Konflik ini dapat dijelaskan dalam jangka masa pendek dalam penggunaan daging ayam adalah anjal untuk model LAIDS-ECM, di mana ia menunjukkan perubahan dalam jangkamasa pendek dalam cara penggunaan. Tetapi, dalam jangkamasa panjang, ia merupakan barangan normal seperti dijangkakan oleh model LAIDS.

Kesan bersih daripada perbelanjaan, perubahan dalam harga kambing adalah lebih sensitif jika dibandingkan dengan tiga produk daging yang lain. Dengan menggunakan, keanjalan silang harga, terdapat sedikit penggantian antara ikan dengan tiga produk daging yang lain manakala daging lembu menunjukkan darjah penggantian yang paling tinggi. Kajian ini juga menunjukkan bahawa polisi harga bagi daging adalah tidak sensitif bagi pengguna dalam jangka masa pendek.

Kita juga mengenalpasti bahawa terdapat pecahan struktur dalam permintaan daging di Malaysia. Dalam ujian perubahan struktur menunjukkan aliran dan virus Nipah memberi kesan dalam penggunaan daging di Malaysia. Kajian menunjukkan bahawa pengguna Malaysia memberi refleks negatif terhadap khinzir, manakala memberi refleks positif untuk daging ayam, lembu dan ikan semasa dan selepas krisis berlaku. Ini kerana penggunaan terhadap khinzir menurun yang menyebabkan perbelanjaan yang lebih tinggi dan keanjalan harga daging khinzir selepas krisis. Aliran penggunaan negatif khinzir per kapita berlaku manakala penggunaan per kapita untuk daging lembu dan kambing akan meningkat. Ini memberikan prospektif yang baik untuk industri daging lembu dan kambing di mana ia mempunyai permintaan yang tinggi pada masa akan datang. Oleh itu, industri daging lembu mempunyai setiap insentif untuk berkembang mengkaji permintaan pengguna kerana ini menawarkan potensi yang lebih besar untuk meningkat dan meningkat pada masa akan datang.

Maklumat yang ditunjukkan dalam kajian adalah untuk membandingkan kajian permintaan penggunaan yang lepas dan turut memberi pengetahuan yang berguna dalam penggunaan daging di Malaysia. Kajian ini penting dalam membentuk permintaan daging dengan membandingkan dengan menggunakan tiga model serta mengganggarkan kesan daripada pendapatan dan harga penggunaan daging di Malaysia.

Kajian-kajian yang lepas hanya menggunakan satu model sahaja dalam membuat cadangan polisi. Kita membentangkan bahawa kriteria dalam pemilihan model mesti dinilai sebelum melaksanakan hasil dari permintaan untuk menilai permintaan daging dan kebajikan pengguna. Ini kerana perbandingan di antara model adalah penting di mana ketiga-tiga model menunjukkan keanjalan yang berbeza di mana ia boleh digunakan untuk menganggarkan permintaan masa hadapan serta boleh dijadikan sebagai panduan dalam pengeluaran domestik. Pada masa yang sama, ia dapat meningkatkan kebajikan pengguna. Analisis ini juga dapat memberi sumbangan dalam proses membuat keputusan pembentukan polisi daging di Semenanjung Malaysia.

ACKNOWLEDGEMENTS

In the name of Allah, the Compassionate, the Merciful. Peace is upon His messengers. I thank God for His blessing and love that made me finished this dissertation and completed my education.

I would like to acknowledge the support and assistant of my advisors, friends, and family who made this dissertation possible. Your encouragement and support sustained me on my journey through the doctoral processes.

First and foremost, I would like to express my deep appreciation and gratitude to my supervisor and thesis committee chairman, Associate Prof. Dr Zainalabidin Mohamed, who supported me by constantly giving constructive comments and providing directions toward the completion of this dissertation. I am deeply grateful for his continual guideline, encouragement, and inspiration during up and down in my dissertation research process. This dissertation would not be possible without his help.

To my dissertation committee members, Professor Dr Mad Nasir Shamsudin and Associate Prof. Dr. Zulkarnain Yusop, thank you for generously giving of your time, insights on empirical techniques, important feedbacks, and energies to improve this dissertation.

I am also indebted to members of the Department of Agribusiness and Information System, Faculty of Agriculture and UPM Library at Universiti Putra Malaysia who rendered assistance at various stages of this study.

I am so blessed to have nice friends at the Universiti Putra Malaysia. My best friend Dr Adnan Al soney, Dr Abdullahi Ali Mohamed (Xoogsade), Dr Ibrahim Sh. Abdulqadir (Shidane), Dr Mohamed Al-ghol, Golnaz Rezai, Nalini Arumugam, Suriani Darham and many more have made my study an enjoyable journey. I thank them all.

My appreciation is also extended to all my Somali friends in Malaysia, especially: Sheikh Najib Sheikh Abdisamad, Ali Hussain (Ali libya) , Husein Haji Rabbi, Abdullahi Sirad Kilwe and Dr Ahmed Awil.

I gratefully acknowledge the substantial contribution of my friends Jamila Sheekh Adan and Natrah Hani Mednasir. You made my life so meaningful and wonderful. You were always there for me, supported me, and stood by my side in every situation.

My deepest gratitude to all friends and families who cannot be mentioned in this short acknowledgement, I appreciate any help and contribution from you to the process toward the completion of this dissertation and my doctoral study.

Last but not least, to my father, Farah Ahmed Yusuf and mother, Awrala Samatar Osman, I pray Allah to give them blessings and protection. I can never thank them enough for the sacrifices they make in laying the foundation during the early stages of my life and I know of their constant pray for my continued safety that brought me to where I am today. They were my visionary supporters in realizing my educational dreams, although they cannot write and read. No words can properly express my gratitude for their love and support. Thank you for your love and prayer. I dedicate this work for you, with lots of love

I certify that an Examination Committee has met on 3/11/ 2006, to conduct the final examination of Abdullahi Farah Ahmed on his Doctor of Philosophy thesis entitled "An Empirical Analysis of Demand System Models: A Case of Meat Demand in Peninsular Malaysia" in accordance with Universiti Pertanian Malaysia(High Degree) Act 1980 and Universiti Pertanian Malaysia (High Degree) Regulations1981.The committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

Md. Ariff Hussien, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Mohd Mansor Ismail, PhD
Associated Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

Amin Mahir Abdullah, PhD
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

Mohd Fauzi Mahd Jani, PhD
Professor
Faculty of Economics and Management
Universiti Kebangsaan Malaysia
(External Examiner)

HASANAH MOHD GHAZALI, PhD
Professor/ Deputy Dean
School of Graduate Studies,
Universiti Putra Malaysia
Date:

This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of Supervisor Committee are as follows:

Zainalabidin Mohamed, PhD
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Mad Nasir Shamsudin, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

Zulkarnain Yusop, PhD
Associate Professor
Faculty of Economics and Management,
Universiti Putra Malaysia
(Member)

AINI IDERIS, PhD
Professor/Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 8 FEBRUARY 2007

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

_____

ABDULLAHI FARAH AHMED

Date: 21 DECEMBER 2006

TABLE OF CONTENTS