



UNIVERSITI PUTRA MALAYSIA

**ENERGY INTENSITY AND IMPACT OF ENERGY PRICES ON
INFLATION AND HOUSEHOLDE EXPENDITURE IN MALAYSIA**

NARGES MORADKHANI

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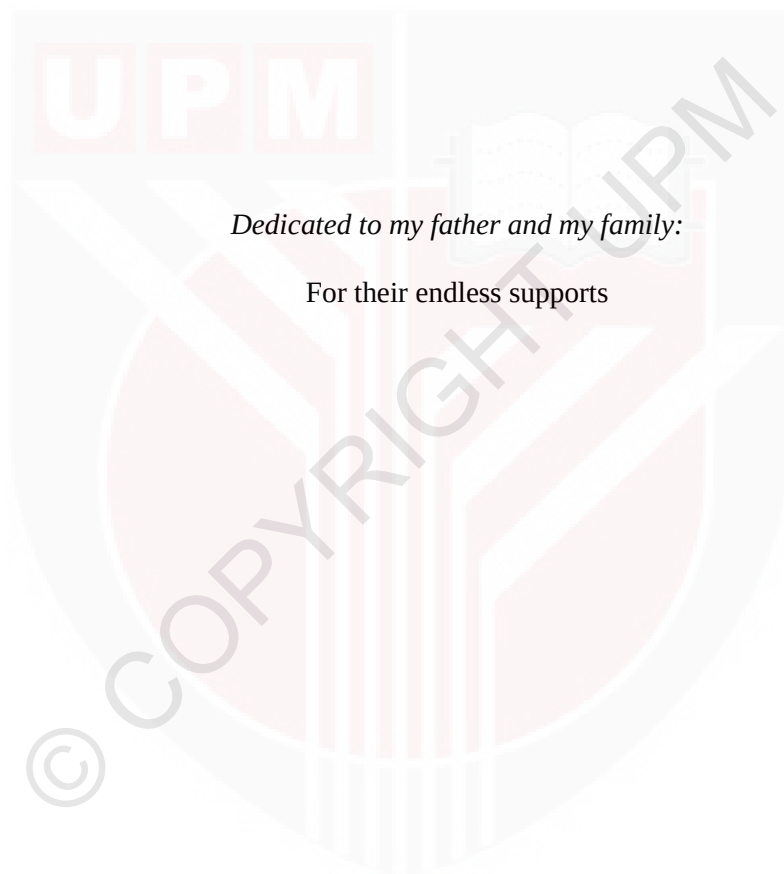
**ENERGY INTENSITY AND IMPACT OF ENERGY PRICES ON
INFLATION AND HOUSEHOLDE EXPENDITURE IN MALAYSIA**

By

NARGES MORADKHANI

**Thesis Submitted to the School of Graduate Studies,
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Abstract of thesis presented to the Senate of the Universiti Putra Malaysia in fulfillment of the requirements for the degree of Doctor of Philosophy

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By

Narges Moradkhani

August 2011

Chairman: Prof. Annuar Md Nassir, PhD

Faculty: Economics and Management

Malaysia is a developing country and its economy is growing, in order to keep growing at its present rate, must be supported by a stable and reliable energy supply. In the past, sustained economic growth has resulted in a growing consumption of energy. In order to achieve sustainable and reliable energy supply, energy requirements must be regulated. For This purpose an estimation of future energy requirements in lights of improving its efficiency is required and recognizing energy consumption patterns among households and energy intensity among productive sectors is needed.

It is important to note that, fluctuation in energy prices, particularly price of crude oil could exert an important influence on the macroeconomics of the country. This study, therefore, tries to construct a hybrid energy I-O table, conduct sectoral energy intensity analysis and evaluate the effects of higher energy prices on inflation and

household expenditures. The hybrid energy I-O table shows that Industrial and Transport sectors consumed approximately 80% of the country's consumption of energy over time. Therefore, if we give special attention to these two sectors, it could help to conserve energy consumption effectively. In addition, any study such as the present one, could help policy makers in strategizing the future sustainable development of the industry and help households to be more prudent in energy consumption.

Results of the present study reveal that in general energy intensity of the economy has increased over time. The energy intensity for all sectors computed 0.094 and 0.103 *toe/'000 RM* and for non-energy sectors quantified 0.069 and 0.077 *toe/'000* in the years 2000 and 2005 respectively. The most energy intensive sectors remained the same while the least energy intensive sectors changed slightly during 2000 – 2005 periods. It is also found that value-added share of high energy intensive sectors is higher than that of the low energy intensive sectors. It means that Malaysian economy can switch from more polluted, high CO₂ emission and high energy intensive sectors to clean, less energy intensive and high value added activities.

In this research we assumed that the energy consumption behavior of consumers and producers remained constant, a double increase in the price of energy would lead to the value of household expenditure increased by 20 and 17 in years 2000 and 2005 respectively for the same quantities. Households consume 8121293 toe and 10762104 toe energy in Malaysian economy in the years 2000 and 2005. The households are responsible for almost 30 percent of energy consumption in Malaysia. Their energy consumption increase about 30 percent within years 2000 to 2005.

By doubling the energy prices the sectoral price change 14.57 % and 15.43 % in the years 2000 and 2005 while CPI change 14.74 % and 11.21% respectively in the same years. These changes in CPI can have several reasons i) weights of CPI changes over years ii) Households expenditure pattern changes over years iii)The economy becomes less susceptible in response to energy price shocks.

Different groups of household expenditure affected by increasing the price of energy dissimilarly for urban and rural households. The group Food and Non-Alcoholic Beverage Rural more affected than urban in both years 2000 and 2005. But the groups Transport and Electricity, gas & other fuel urban more affected than rural in both years. In term of strata, bottom quintile more affected in the group Gross rent, Fuel & Power while top quintile more affected in the group Transport and Communications. The lowest income category of household, which is represented by the first quintile of the household strata, is the most vulnerable to the increase in the price of energy through the indirect effect of inter-sectoral linkages.

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

**KEAMATAN TENAGA DAN KESAN HARGA TENAGA TERHADAP
INFLASI DAN PERBELANJAAN ISI RUMAH DI MALAYSIA**

Oleh

Narges Moradkhani

Ogos 2011

Pengerusi: Prof. Annuar Md Nassir, PhD

Fakulti: Ekonomi dan Pengurusan

Malaysia adalah sebuah Negara yang membangun dan ekonominya sedang berkembang. Bagi memastikan pertumbuhan ini kekal pada kadar sekarang, ia perlu disokong oleh bekalan tenaga yang stabil dan terjamin. Pada masa lalu, pertumbuhan ekonomi yang mampan telah menyebabkan peningkatan penggunaan tenaga. Bagi mencapai bekalan tenaga yang mampan dan boleh dipercayai, keperluan tenaga mesti dikawal selia. Untuk tujuan ini, anggaran keperluan tenaga masa depan penting bagi menambahkan kecekapan dan mengenalpasti corak penggunaan tenaga di kalangan isi rumah dan intensiti tenaga di kalangan sektor-sektor yang produktif adalah diperlukan.

Adalah penting untuk diperhatikan bahawa turun naik harga tenaga terutamanya harga minyak mentah boleh memberikan pengaruh penting kepada asas ekonomi

Negara. Oleh itu, kajian ini cuba untuk membina jadual I-O tenaga hibrid, menjalankan analisis tenaga intensiti sektoral dan menilai kesan harga tenaga yang lebih tinggi terhadap inflasi dan perbelanjaan isi rumah. Jadual I-O tenaga hibrid menunjukkan sektor Industri dan Pengangkutan menggunakan kira-kira 80% daripada penggunaan tenaga Negara dari semasa ke semasa. Oleh itu, jika kita memberikan perhatian khusus kepada kedua-dua sektor ini, ia dapat membantu menjimatkan penggunaan tenaga secara berkesan. Di samping itu, sebarang kajian seperti ini, dapat membantu pembuat dasar dalam strategi pembangunan industri masa depan yang mampan dan membantu isi rumah menjadi lebih berhemah dalam penggunaan tenaga.

Keputusan kajian ini menunjukkan secara umum, intensiti tenaga bagi ekonomi telah meningkat dari semasa ke semasa. Intensiti tenaga bagi semua sektor yang dikira 0.094 dan 0.103 toe/'000 RM dan bagi sektor bukan tenaga yang kuantitinya 0.069 dan 0.077 toe/'000 bagi tahun 2000 dan 2005. Kebanyakan sektor tenaga intensif kekal serupa manakala sedikit sektor tenaga intensif mengalami perubahan sepanjang tempoh 2000 – 2005. Ia juga didapati bahawa bahagian nilai tambah bagi sektor tenaga intensif yang tinggi adalah lebih tinggi daripada sektor tenaga intensif yang rendah. Ini bermakna bahawa ekonomi Malaysia boleh beralih daripada lebih tercemar, pembebasan CO₂ yang tinggi dan sektor tenaga intensiti yang tinggi kepada bersih, kurang tenaga intensif dan aktiviti nilai tambah yang tinggi.

Dalam kajian ini, kita mengandaikan bahawa tingkah laku pengguna dan pengeluar kekal malar, peningkatan berganda dalam harga tenaga akan meningkatkan nilai perbelanjaan isi rumah sebanyak 20 dan 17 masing-masing dalam tahun 2000 dan 2005 bagi kuantiti yang sama. Isi rumah menggunakan 8121293 toe dan 10762104 toe tenaga dalam ekonomi Malaysia bagi tahun 2000 dan 2005. Isi rumah

bertanggungjawab bagi hampir 30 peratus penggunaan tenaga di Malaysia. Penggunaan tenaga mereka ini meningkat kira-kira 30 peratus dalam tempoh tahun 2000 hingga 2005.

Dengan dua kali penggandaan harga tenaga, harga sektoral berubah 14.57% and 15.43% dalam tahun 2000 dan 2005 manakala perubahan CPI 14.74% dan 11.21% masing-masing bagi tahun yang serupa. Perubahan-perubahan dalam CPI boleh mempunyai beberapa sebab i) berat perubahan CPI dari tahun ke tahun ii) Corak perbelanjaan isi rumah berubah dari tahun ke tahun iii) Ekonomi menjadi kurang terdedah kepada kejutan harga tenaga.

Kumpulan yang berbeza bagi perbelanjaan isi rumah yang terjejas dengan peningkatan harga tenaga adalah berbeza bagi isi rumah Bandar dan Luar Bandar. Kumpulan Makanan dan Minuman Bukan Alkohol di Luar Bandar lebih terjejas daripada kawasan Bandar dalam kedua-dua tahun 2000 dan 2005. Tetapi bagi kumpulan Pengangkutan dan Elektrik, Gas & Bahan Api Lain di Bandar lebih terjejas daripada Luar Bandar bagi kedua-dua tahun tersebut. Dalam bentuk strata pula, kuartil bawah yang lebih terjejas adalah kumpulan Sewa Kasar, Bahan Api, & Kuasa manakala kuartil atas yang terjejas adalah kumpulan Pengangkutan dan Komunikasi. Kategori pendapatan isi rumah yang paling rendah, yang diwakili oleh kuartil pertama bagi strata isi rumah, merupakan yang paling terdedah kepada peningkatan dalam harga tenaga melalui kesan secara tidak langsung bagi hubungan antara sektor.

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I certify that a Thesis Examination Committee has met to conduct the final examination of Narges Moradkhani on his thesis entitled “Sectoral Energy Intensity and Impact of Higher Energy Prices on Household Expenditure” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the University Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Doctor of Philosophy.

Members of the Thesis Examination Committee were as follows:

Prof. Dr. Khalid Abdul Rahmin
(Chairman)

Prof. Dr. Muzafar Shah Habibullah
(Internal Examiner)

Prof. Madya Dr. Alias Radam
(Internal Examiner)

Prof. Dr. Erik Dietzenbacher
(External Examiner)

NORITA OMAR, PhD

Assoc. Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

The thesis was submitted to the senate of University Putra Malaysia has been accepted as the fulfillment requirement for the degree of Doctor of Philosophy. The members of Supervisor Committee were as follows:

Annuar Md Nassir, PhD

Professor
Faculty of Economy and Management
Universiti Putra Malaysia
(Chairman)

Zakariah Abd Rahid, PhD

Professor
Faculty of Economy and Management
Universiti Putra Malaysia
(Member)

Taufiq Hassan, PhD

Associate Professor
Faculty of Economy and Management
Universiti Putra Malaysia
(Member)

HASANAH MOHD GHAZALI, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declare that the thesis is my original work except for the quotation and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at University Putra Malaysia or at any other institution.

A large, faint watermark of the University Putra Malaysia (UPM) logo is visible in the background. It features a shield with a book and the letters 'UPM'.

Narges Moradkhani

Date: 25 August 2011

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