Yew Joe Ho[1], **Thien Hoong Tew**[2], **Datuk Kasim Mansur**[3]
**INCOME ELASTICITY OF DEMAND IN MALAYSIA DURING
THE PERIOD OF FUEL INDUCED INFLATION**

This paper investigates the impact of the fuel induced inflation that occurred in 2008 on Malaysian consumer behavior. The drastic hike in the price of crude oil in 2008 resulted in one of the sharpest increase of CPI in the country's history. Using a set of the survey data that captured the changes in spending pattern before and after inflation, the paper computed the overall income elasticity of demand in real terms based on aggregate CPI and then further examined the effects of inflation on the spending pattern of the sample in 3 categories, namely the food & non-alcohol beverages, housing, water, electricity, gas and other fuels, and transport. The paper also detailed the sensitivity of consumers based on their demographic attributes such as ethnicity, gender and age.
Keywords: *income elasticity of demand; inflation; household income.*

Є Жо Хо, Тіень Хун Те, Датук Касім Мансур
**ЕЛАСТИЧНІСТЬ ПОПИТУ ПО ПРИБУТКУ В МАЛАЙЗІЇ
В ПЕРІОД ПАЛИВОЗАЛЕЖНОЇ ІНФЛЯЦІЇ**

У статті розглянуто вплив паливозалежної інфляції, яка відбувалася в 2008 р., на поведінку малайзійських споживачів. Різке підвищення цін на сиру нафту в 2008 р. призвело до одного з найзначніших підвищень індексу споживчих цін (ІСЦ) в історії країни. З використанням даних опитування, що стосувалося змін структури витрат до і після інфляції, розраховано загальну еластичність попиту по прибутку в реальному вираженні на основі сукупного ІСЦ, вивчено вплив інфляції на структуру витрат за трьома категоріями — їжа і неалкогольні напої; комунальні послуги, вода, електрика, газ та інше паливо; транспорт. Також детально розглянуто чутливість споживачів залежно від демографічних показників — етнічної приналежності, статі та віку.
Ключові слова: *еластичність попиту по прибутку; інфляція; прибуток сім'ї.*
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Е Жо Хо, Тиень Хун Тэ, Датук Касим Мансур
**ЭЛАСТИЧНОСТЬ СПРОСА ПО ДОХОДУ В МАЛАЙЗИИ
В ПЕРИОД ТОПЛИВОЗАВИСИМОЙ ИНФЛЯЦИИ**

В статье рассмотрено влияние топливозависимой инфляции, которая происходила в 2008 г., на поведение малайзийских потребителей. Резкое повышение цен на сырую нефть в 2008 г. привело к одному из самых значительных повышений индекса потребительских цен (ИПЦ) в истории страны. С использованием данных опроса, касающегося изменений структуры расходов до и после инфляции, рассчитана общая эластичность спроса по доходу в реальном выражении на основе совокупного ИПЦ, изучено влияние инфляции на структуру расходов по трем категориям — еда и неалкогольные напитки; коммунальные услуги, вода, электричество, газ и другое топливо; транспорт. Также подробно рассмотрена чувствительность потребителей в зависимости от демографических показателей — этнической принадлежности, пола и возраста.
Ключевые слова: *эластичность спроса по доходу; инфляция; доход семьи.*

[1] PhD Candidate, Lecturer, Labuan School of International Business and Finance, University Malaysia Sabah, Malaysia; Faculty of Economics and Administration, University of Malaya, Kuala Lumpur, Malaysia.
[2] FOREX Analyst, Faculty of Economics and Administration, University of Malaya, Kuala Lumpur, Malaysia.
[3] PhD (Economics), Associate Professor, University Malaysia Sabah, Kota Kinabalu, Malaysia.

Introduction. Malaysia suffered a public discontent in mid-2008 when the world experienced a sharp increase in oil prices, peaking at over USD 140 per barrel in June. The abrupt steep rise, especially between March and May, prompted Malaysian government to reduce fuel subsidy and hence increase the price of fuel by about 41%, in particular the price of fuel type RON97 was increased to RM 2.70 per liter and price of diesel by 63% when the world's crude oil price skyrocketed to above USD 110 per barrel in May 2008. The hike of domestic fuel prices subsequently produced inflationary pressure on domestic goods. The first alarm was set off in that month itself when Malaysia's inflation rate reached a 22-month top of 3.8%.

Figure 1 below shows the monthly crude oil prices from 1946 to 2008. The world experienced one of the worst oil crisis in history in the mid of 2008 due to speculative trading on future contracts.

According to Wall Street Journal (2008), Malaysian government was quoted to have been forced to raise prices because it could no longer afford to subsidize fuel consumption of its people amidst record oil price levels. The authorities even revealed that food and nonalcoholic beverages contributed 89% to the rise in inflation for the month and predicted that the inflation would not reach double digits because the transport sector which consumes fuel the most made up only 15.9% of consumer prices.

This assertion was proven to be inaccurate however as the lag effect of inflation was only felt few months later when the country's inflation hit a rate of 8.5% in August, one of the most acute single-month price increases recorded thus far. In October 2008, however, the price of crude oil slid to a 13-month low to just about USD 70 per barrel in wake of slumping equities and looming economic recession, as displayed in Figure 2.

The decline of crude oil price coupled with the impending recession and the general derisive sentiment of the public impelled the government to reduce the domestic fuel price in tandem with the world's crude oil price twice in September and October 2008. Nonetheless, due to what economist termed as the 'sticky' price effect, the hike in prices of domestic goods and services in the preceding months remained mostly unchanged.

Indeed, according to the Department of Statistics (Table 1), the consumer price index (CPI) over January to August 2008 had increased by 4.8% to 110.4 in relative to that of 105.3 in the same period last year. Specifically, in comparison to the same month in 2007, the index for food and non-alcoholic beverages of August 2008 showed an increase of 11.7% meanwhile that for non-food items increased by 7.0%. Also, except for clothing and footwear, communication and semidurable goods, prices of all other categories were greater. Some of the most significant hikes which are deemed to have a direct impact on the everyday lives of Malaysian were the categories of transport and food and non-alcoholic beverages, recording an escalation of 21.8% and 11.7% respectively. On year-on-year basis, the cost of transportation climbed by 8.6% whereas the cost for food inflated by 7.5%.

Against this backdrop, this paper intends to explore the impacts of the recent inflation on the lives of Malaysians and the means adopted by them in mitigating the rise in the cost of living. To achieve this objective, a self-administered survey had been conducted in the ending months of 2008.
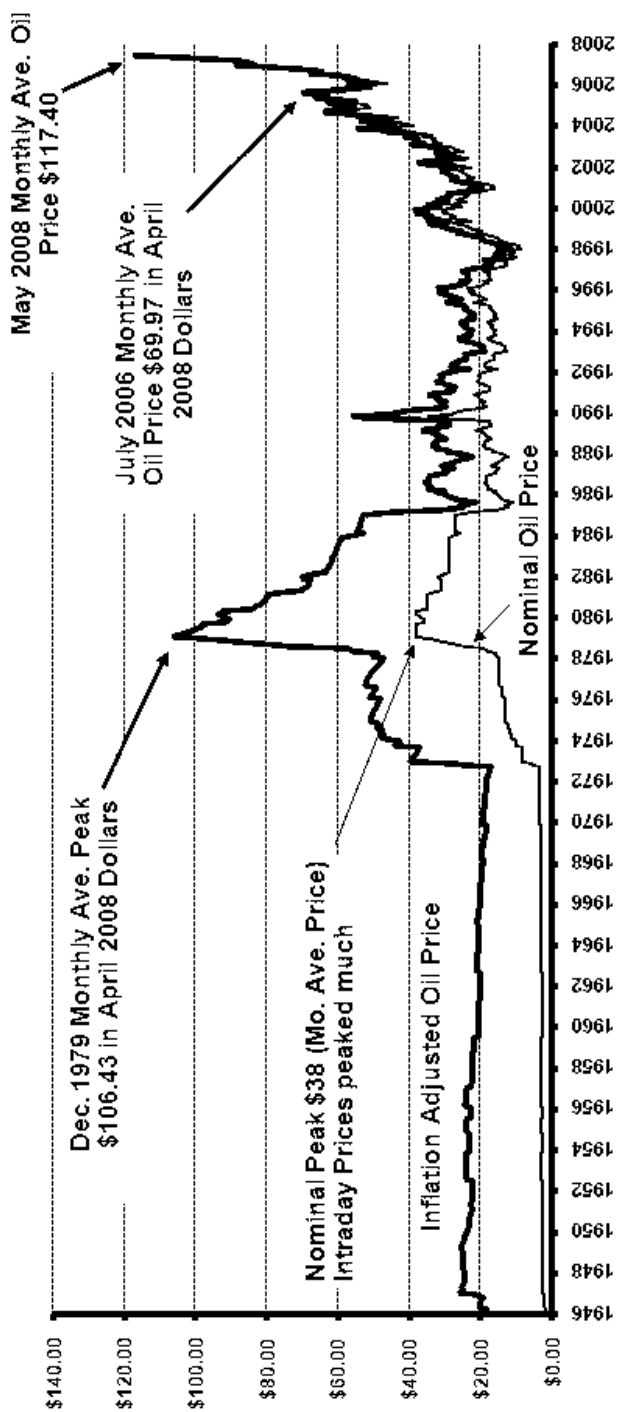
Source: www.inflationdata.com.

Figure 1. **Inflation adjusted monthly average crude oil prices in April 2008 (1946–2008)**, *USD*

Source: WTRG Economics, www.wtrg.com.

Figure 2. **Daily closing price of crude oil in USD (Oct 1, 2007–Oct 21, 2008)**

Table 1. **Consumer price index by main groups, Malaysia (2005 = 100)**

Group	Wt.	Index				% Change			
		Aug 2007	July 2008	Aug 2008	Jan-Aug 2007	Jan-Aug 2008	Aug'08 / July '08	Aug'08 /Aug '08	Jan-Aug 2008/ 07
Total	100.0	105.9	114.7	114.9	105.3	110.4	0.2	8.5	4.8
Food & Non-Alcoholic Beverages	31.4	106.4	118.8	118.9	105.8	113.7	0.8	11.7	7.5
Alcoholic Beverages & Tobacco	1.9	120.1	120.6	120.6	112.7	120.3	0.0	11.7	7.5
Clothing and Footwear	3.1	96.8	96.8	96.4	97.5	97.0	-0.4	-0.4	-0.5
Housing, Water, Electricity, Gas & Other Fuels	21.4	103.1	104.6	104.9	102.7	104.1	0.3	1.7	1.4
Furnishing, Household Equip. & Routine Household Maintenance	4.3	102.3	105.9	106.4	102.0	104.3	0.5	4.0	2.3
Health	1.4	103.7	106.1	106.3	103.4	105.5	0.2	2.5	2.0
Transport	15.9	113.6	139.4	138.4	113.4	123.1	-0.7	21.8	8.6
Communication	5.1	97.2	96.7	96.7	97.5	96.9	0.0	-0.5	-0.6
Recreation Services & Culture	4.6	103.1	103.9	104.0	101.6	103.6	0.1	0.9	2.0
Education	1.9	103.5	105.9	106.1	103.3	105.6	0.2	2.5	2.2
Restaurants & Hotels	3.0	108.6	115.2	115.7	106.4	113.7	0.4	6.5	6.9
Miscellaneous Goods & Services	6.0	103.0	107.2	107.0	102.8	106.3	-0.2	3.9	3.4
Non-Food	68.6	105.7	113.2	113.1	105.1	108.9	-0.1	7.0	3.6
Durable Goods	8.0	96.8	99.2	99.0	97.0	98.6	-0.2	2.3	1.6
Semi-Durable Goods	4.3	97.9	98.5	98.2	98.4	98.4	-0.3	0.3	0.0
Non-Durable Goods	40.6	109.8	126.5	126.5	109.1	117.6	0.0	15.2	7.8
Services	47.1	104.6	108.4	108.9	103.8	107.2	0.5	4.1	3.3

Source: Department of Statistics, Malaysia.

The latest inflationary episode in Malaysia resembles those that occurred in the 1970s, 1980s, and 1990s. In fact, inflationary occurrences in Malaysia have almost always coincided with world's oil hikes.

For instance, inflation rose significantly at both international and domestic markets in 1973–1974 (Cheng and Tan, 2002), driven primarily by acute oil price increases and loose monetary policy in the US. In Malaysia, the situation was exaggerated by shortages of food and raw materials arising from bad weather and greater aggregate demand. Consequently, consumer prices in Malaysia rose and reached the record of 10.62% by the end of 1973, before peaking at 17.29% in 1974. A year later, Malaysia slumped into its great recession, with growth rate of only 0.8% in 1975 in contrast to 8.3% in the preceding year. Correspondingly, inflation was reduced to the level of 4.5% in 1975.

The second episode of high prices came to Malaysia in 1980 and 1981. Global oil prices rose by 47% in 1979 and 66% in 1981, following Organization of Oil-Exporting Countries (OPEC) cartel's output restriction. As a result, prices of world's industrial raw materials and investment goods increased rapidly. In Malaysia, inflation accelerated from 3.6% in 1979 to 9.62% in 1981. Greater inflations in the OECD countries of about 10% also contributed to higher consumer prices in Malaysia through increases in import costs. All this led to supply shortages of diesel and construction materials and the increase in petrol prices in Malaysia by the average of about 9.1%.

The next episode of inflation arrived in the early 1990s when Iraqi invasion of Kuwait set off a round of oil price escalations, with price rising from $18 per barrel from its pre-crisis level to about $36 in October 1990. In Malaysia, the effect of the increase in oil price was felt with some time lags. The inflation rate increased after one year of the outbreak of Gulf war, from 2.61% in 1990 to 4.39 and 4.75 in 1991 and 1992 respectively.

Literature Review. Inflation is defined as increase in general level of prices in an economy that is sustained over a period of time. The avoidance of inflation has long been one of the main objectives of macroeconomics policy. Inflation is considered to be undesirable because of its adverse effects on income distribution (people on fixed income suffer), lending and borrowing (lenders lose, borrowers gain), speculation (diversion of saving away from industry into property and commodity speculation), international trade competitiveness (exports become relatively more expensive, imports cheaper), and unemployment. Hyperinflation is particularly serious because people lose confidence in the use of money for exchange purposes and the economic system is liable to collapse.

There are several explanations of why inflation occurs. One is the presence of excess demand at full employment level of national output or "demand-pull inflation" and the other is an increase in factor output costs or "cost-push inflation". In the first half of 2008, prices for domestic goods and services were swelling due to bubble in oil assets, that in turn could have been the result of carry trade fueled by excessive monetary expansions implemented by the US Federal Reserve System since the burst of the tech bubble and the 9/11 events.

How do increases in oil price translate into general hike in consumer prices? According to Cavallo (2008), rising oil prices tend to affect the overall CPI directly by raising its energy cost component, which includes the prices of energy-related items,

such as household fuels, motor fuels, gas, and electricity. Among these, gasoline and fuel oil are directly derived from crude oil, so their prices follow oil prices very closely. An increase in the price for oil may also affect energy costs through the prices for other items that are close substitutes; for example, households and businesses may switch from oil-related energy items to natural gas, thus leading to an increase in its price. The extent to which rising oil prices translate into higher overall inflation through higher energy costs depends on their persistence. If they continue to rise, they may lead to sustained increases in the overall price level, that is, to an increase in the overall inflation rate.

Rising oil prices also tend to affect the core portion of the CPI indirectly, because energy prices represent a considerable portion of the production cost of many of the items in it, particularly transportation services. In addition, if workers have to pay higher energy prices themselves, they may bargain for compensating wage increases, which also raises the production costs of items in the core CPI. The extent to which rising oil prices translate into higher core inflation through higher production costs depends, among other things, on how much they make up the overall inflation expectations of those who set prices and wages. In fact, if rising oil prices lead to higher inflation expectations over the longer term, rising energy and wage costs are more likely to be passed through in terms of rising consumer prices.

One way to examine the impact of rising oil prices on core inflation is to estimate a Phillips curve model. According to this widely used statistical relationship, current inflation depends on lagged inflation, on the lagged unemployment gap, and on a lagged measure of output supply shocks. Lagged inflation captures the degree of inflation persistence. The unemployment gap, defined as the deviation of the unemployment rate from its baseline value, measures inflationary pressures emanating from the labor market. Meanwhile, the measure of output supply shocks captures inflationary pressures emanating from supply factors, such as oil price increases.

Methodology. The primary aim of this study is to ascertain the impacts of the recent inflation on the lives of Malaysians and the means adopted by them in mitigating the rise in the cost of living. The tool used is the questionnaire designed by the academics of Faculty of Economics and Administration, University Malaya, under the title "Impact of Rising Cost on the Malaysian Economy and Its People". The survey for the research was conducted in early September 2008 using convenience sampling. The total of 446 respondents had participated voluntarily in the nationwide survey. By that time, the local prices of fuel had already been cut slightly on August 23, 2008 – the price for RON 97 fuel had been down from RM2.70/L to RM2.55/L. The collection of the data was completed before the second reduction in fuel prices by the government on Sept. 25, 2008.

Hence, in order to portray the most precise respondents' feedbacks corresponding to the cost of living, the CPI of August 2008 is used instead of September to prevent the ripple effects of the second price cut from distorting the analysis. The adverse outcome of the unstable domestic fuel prices on the economy was rather evident as the total CPI continued to rise from 114.7 in August to 114.9 in September. Apart from the decline of transportation costs as a direct result of the second fuel price cut, the prices in the food and non-alcohol beverages category and the "housing, water, electricity, gas and other fuels" category continued to rise.

Following the concept of income-elasticity of demand, a measure used to quantify the degree of responsiveness of demand to a given change in income, this paper makes a slight modification to the methodology to accommodate the data collected in the survey. The tool is deployed to measure individual price sensitivity and average price sensitivity of all the respondents. The equation is expressed as follows:

Income-elasticity of demand (*IED*):

$$IED = \%\Delta D / \%\Delta Inc = \left[\frac{D_t - D_k}{D_k}\right] / \left[\frac{Inc_t - Inc_k}{Inc_k}\right], \qquad (1)$$

where D — quantity demanded (in units); Inc — income; t — contemporary period during inflation; k — 6 months prior to inflation.

Consider non-adjusted nominal *IED* (for individual):

$$* NIED_i = \%\Delta Exp_i / \%\Delta Inc_i = \left[\frac{NExp_{it} - NExp_{ik}}{NExp_{ik}}\right] / \left[\frac{NInc_{it} - NInc_{ik}}{NInc_{ik}}\right] \qquad (2)$$

and adjusted *NIED* (for individual):

$$NIED_i = \%\Delta NExp_i / \%\Delta RInc_i = \left[\frac{NExp_{it} - NExp_{ik}}{NExp_{itk}}\right] / \left[\frac{RInc_{it} - RInc_{ik}}{RInc_{ik}}\right], \qquad (3)$$

where $NExp$ — nominal expenditure (in monetary value); $NInc$ — nominal household income; $RInc$ — real household income (factored with CPI, 2005 = 100).

Therefore, the average $NIED_i$ for n individuals is:

$$n^{-1}\sum\nolimits_{i=1}^{n} NIED_i = n^{-1}\sum\nolimits_{i=1}^{n}[(\%\Delta NExp_i) / (\%\Delta RInc_i)]. \qquad (4)$$

Although the household income for the sampled population was collected in intervals (e.g., RM1000−RM1499, RM1500−RM1999 etc.), the derivation for the denominator of $RInc_i$ is unaffected because it is assumed that change in household income only occurs in real value which is the nominal value factored by the CPI of base year 2005. In other words, it is assumed that nominal household income did not change in the course of 6 months, from the period before inflation to after inflation. The CPI for August (labeled as "current" CPI) is 114.9 whereas the average CPI for the past 4 to 8 months ("6-month-ago" CPI) is approximately 108.0. Average CPI is used to represent 6-month-ago CPI because the respondents might not recall how much they had spent 6 months ago. Hence, average CPI for the past 4 to 8 months could be a good approximation.

The following illustrates the computation of *NIED*:

Given: CPI_t = 114.9 (for August 2008); CPI_k = 108.0 (approximate before inflation). To compute "real" household income, the CPIs are divided by the base year of 2005 = 100 i.e. CPI_t = 1.149 and CPI_k = 1.080. Hence, all CPIs quoted are in the values divided by 100 hereafter.

Then, let the nominal household income be $NInc_i$. Because the income data collected from the survey are assumed to be constant through the concerned period, the only change in income is the "real" value of $NInc_i$. Consider Equation (3):

$$NIED_i = \left[\frac{NExp_{it} - NExp_{ik}}{NExp_{ik}}\right] / \left[\frac{RInc_{it} - RInc_{ik}}{RInc_{ik}}\right] = \left[\frac{NExp_{it} - NExp_{ik}}{NExp_{ik}}\right] /$$
$$/ \left[\frac{(NInc_i /1.149) - (NInc_i /1.080)}{(NInc_i /1.080)}\right] = \left[\frac{NExp_{it} - NExp_{ik}}{(-0.060)NExp_{ik}}\right]. \qquad (5)$$

Referring to equation (4). Therefore,

$$n^{-1}\sum_{i=1}^{n} {}^{*}NIED_i = n^{-1}\sum_{i=1}^{n}[(NExp_{it} - NExp_{ik})/(-0.060NExp_{ik})]. \qquad (6)$$

This derivation clearly demonstrates the irrelevancy of the measuring scale used in real household income − whether interval or otherwise. The denominator for $NIED_i$ is a constant, that is -0.060, if the CPI_k is 108.0 and the CPI_t is 114.9.

For the example above, $NIED_i$ is -1.263. Hence, for every 1% fall in real household income, nominal expenditure would increase by 1.26%. Note that the real income of Malaysian has indeed dropped by 6% (-0.060 x 100%) over the period according to the Department of Statistics, Malaysia. Nevertheless, the relationship might not be negative for all the respondents as price sensitive respondents might have cut down on quantity consumed due to inflation. In this case, the relationship would be positive. Note that the above computations are for *nominal* expenditure and *real* income changes. Real income change is captured by the denominator in Equation (5), i.e. $(RInc_{it} - RInc_{ik})/(RInc_{ik})$.

The case for real expenditure and real income changes can also be computed. *Real IED ($RIED_i$)* can be calculated if the nominator $(NExp_{it} - NExp_{ik})/(NExp_{ik})$ is factored with CPIs as well. Based on equation (6), the aggregate ($RIED_i$) is computed as below:

Consider,

$$n^{-1}\sum_{i=1}^{n} RIED_i = n^{-1}\sum_{i=1}^{n}[(\%\Delta RExp_i - \%\Delta RInc_i)] =$$
$$= n^{-1}\sum_{i=1}^{n}[(RExp_{it} - RExp_{ik})/(-0.060RExp_{ik})] =$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NExp_{it}}{AggregateCPI_t} - \frac{NExp_{ik}}{AggregateCPI_k}\right]\bigg/\left[\frac{AggregateCPI_k}{(-0.060NExp_{ik})}\right] = \quad (7)$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NExp_{it}}{1.149} - \frac{NExp_{ik}}{1.080}\right]\bigg/\left[\frac{1.080}{(-0.060NExp_{ik})}\right].$$

The *IED* can also be modified to examine the aggregate responsiveness of demand in real terms by group of consumption (Table 1) with its respective index. Replicating the same derivation method as $RIED_i$, the approximate individual group CPI indexes prior to the sharp rise in inflation can be used as the factor to the respective expenditures that fall into these groups.

Thus, apart from measures of general price sensitivity of $NIED_i$ and $RIED_i$, the exercise also aims to ascertain, amongst the categories of consumption, the top 3 categories most affected by the domino effect of inflation from rise in fuel prices.

For notation, the nominal expenditure (*Exp*) for these categories are $NFExp_i$ for "food & non-alcohol beverages *Exp*", the $NHExp_i$ for "housing, water, electricity, gas and other fuels *Exp*" and the $NTExp_i$ for "transport *Exp*" whereas their nominal / real values income-elasticity of demand are denoted as $NFIED_i / RFEID_i$; $NHIED_i / RHIED_i$ and $NTIED_i / RTIED_i$ in that order. The respective *Nominal IEDs* for these categories replicating equation (5) are expressed as below:

$$NFIED_i = \left[\frac{NFExp_{it} - NFExp_{ik}}{NFExp_{ik}}\right] \bigg/ \left[\frac{RInc_{it} - RInc_{ik}}{RInc_{ik}}\right] =$$
$$= \left[\frac{NFExp_{it} - NFExp_{ik}}{NFExp_{ik}}\right] \bigg/ \left[\frac{(NInc_i / 1.149) - (NInc_i / 1.080)}{(NInc_i / 1.080)}\right] = \qquad (8)$$
$$= \left[\frac{NFExp_{it} - NFExp_{ik}}{(-0.060)NFExp_{ik}}\right].$$

$$NHIED_i = \left[\frac{NHExp_{it} - NHExp_{ik}}{NHExp_{ik}}\right] \bigg/ \left[\frac{RInc_{it} - RInc_{ik}}{RInc_{ik}}\right] =$$
$$= \left[\frac{NHExp_{it} - NHExp_{ik}}{NHExp_{ik}}\right] \bigg/ \left[\frac{(NInc_i / 1.149) - (NInc_i / 1.080)}{(NInc_i / 1.080)}\right] = \qquad (9)$$
$$= \left[\frac{NHExp_{it} - NHExp_{ik}}{(-0.060)NHExp_{ik}}\right].$$

$$NTIED_i = \left[\frac{NTExp_{it} - NTExp_{ik}}{NTExp_{ik}}\right] \bigg/ \left[\frac{RInc_{it} - RInc_{ik}}{RInc_{ik}}\right] =$$
$$= \left[\frac{NTExp_{it} - NTExp_{ik}}{NTExp_{ik}}\right] \bigg/ \left[\frac{(NInc_i / 1.149) - (NInc_i / 1.080)}{(NInc_i / 1.080)}\right] = \qquad (10)$$
$$= \left[\frac{NTExp_{it} - NTExp_{ik}}{(-0.060)NTExp_{ik}}\right].$$

Correspondingly, the respective *Real IEDs* for these categories replicating equation (7) are expressed as below:

$$n^{-1}\sum_{i=1}^{n} RFIED_i = n^{-1}\sum_{i=1}^{n}[(\%\Delta RFExp_i - \%\Delta RInc_i)] =$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NFExp_{it}}{FCPI_t} - \frac{NFExp_{ik}}{FCPI_k}\right] \bigg/ \left[\frac{FCPI_k}{(-0.060 NFExp_{ik})}\right] = \qquad (11)$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NFExp_{it}}{1.189} - \frac{NFExp_{ik}}{1.095^*}\right] \bigg/ \left[\frac{1.095^*}{(-0.060 NFExp_{ik})}\right].$$

$$n^{-1}\sum_{i=1}^{n} RHIED_i = n^{-1}\sum_{i=1}^{n}[(\%\Delta RHExp_i - \%\Delta RInc_i)] =$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NHExp_{it}}{HCPI_t} - \frac{NHExp_{ik}}{HCPI_k}\right] \bigg/ \left[\frac{HCPI_k}{(-0.060 NHExp_{ik})}\right] = \qquad (12)$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NHExp_{it}}{1.049} - \frac{NHExp_{ik}}{1.035^*}\right] \bigg/ \left[\frac{1.035^*}{(-0.060 NHExp_{ik})}\right].$$

$$n^{-1}\sum_{i=1}^{n} RTIED_i = n^{-1}\sum_{i=1}^{n}[(\%\Delta RTExp_i - \%\Delta RInc_i)] =$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NTExp_{it}}{TCPI_t} - \frac{NTExp_{ik}}{TCPI_k}\right] \bigg/ \left[\frac{TCPI_k}{(-0.060 NTExp_{ik})}\right] = \qquad (13)$$
$$= n^{-1}\sum_{i=1}^{n}\left[\frac{NTExp_{it}}{1.384} - \frac{NTExp_{ik}}{1.135^*}\right] \bigg/ \left[\frac{1.135^*}{(-0.060 NTExp_{ik})}\right].$$

* Estimated average values from Dec'07 to April'08 using the approximation technique for 'Aggregate CPI of k (i.e. 6-month-ago) = 108.

where *FCPI* — group-specific CPI for "food & non-alcoholic beverages"; *HCPI* — group-specific CPI for "housing, water, electricity, gas and other fuels"; *TCPI* —

group-specific CPI for "transport"; *FExp* — expenditure for "food & non-alcoholic beverages"; *HExp* — expenditure for "housing, water, electricity, gas and other fuels"; *TExp* — expenditure for "transport". Individual respondents who did not specify any changes of spending behavior for the lapse of 6 months were assumed to be price insensitive.

Results. Results in Table 2 show that aggregate *Nominal EID* is -3.123, indicating that for every 1% decline in real household income, nominal spending increased by about 3.1%. In other words, since Malaysia experienced a sudden steep hike in the rate of inflation, the Malaysians needed to spend an additional 3.1% in nominal ringgit for every 1% decline in the real value of ringgit (using base year of 2005).

The *Real IED* of -1.935 reflects that for every 1% decline in real household income, the Malaysians have to expend additional 1.9% to purchase the same quantity of goods and services. This occurrence could be due to the age of the sample of respondents which is skewed towards the younger age group in which they are less price-sensitive. Similarly, the results of *FIED* (food expenditure in survey questionnaire), *HIED* (electricity and water) and *TIED* (transportation) in real term shows that the Malaysians in general were spending more on their basic necessities after inflation.

Specifically, the *NHIED* of -3.111 suggests that, in relative, the public was less affected by price increase in utilities. This could be due to the fact that inflation in this category has been minimal which is not surprising given that utility prices are government-controlled.

Table 2. **Summary of the Aggregate Income Elasticity of Demand (Price Sensitivity)**

Category of Income Elasticity of Demand	Mean	Std. Deviation
NIED (Nominal Aggregate)	-3.123	7.525
NFIED (Nominal "Food & Non Alcohol Beverages")	-4.051	5.914
NHIED (Nominal "Housing, Water, Electricity, Gas and other Fuels")	-3.111	6.343
NTIED (Nominal "Transport")	-6.099	8.808
RIED (Nominal Aggregate)	-1.935	7.073
RFIED (Nominal "Food & Non Alcohol Beverages")	-2.413	5.446
RHIED (Nominal "Housing, Water, Electricity, Gas and other Fuels")	-2.847	6.259
RTIED (Nominal "Transport")	-2.003	7.223

Even though the increase in group-specific CPI of transportation is rather overwhelming, from about 113.5 to 138.4, the national's *NTIED* did not correspond in as high proportion with this sharp jump. This could be due to the demand on transportation being more elastic because the Malaysians could easily adjust or change their mode of transportation when the one that they usually use cost more. For example, the number of cars entering Kuala Lumpur had gone down quite visibly as reported by some local dailies whereas the number of people choosing to use the Light Rail Transit (LRT) has jumped sharply because the prices of LRT ticket have remained unchanged over this inflation-stricken period. However, it is interesting to note that while the nominal *TIED* is -6.099, the real *TIED* is calculated at only -2.003, meaning that the CPI for this group might have been grossly understated, i.e. the Malaysians were actually paying an extra 6% in nominal Ringgit for an increase in quantity of transport service of only 2%.

The *NIED* which computes at -4.051 indicates that in relative, to the pattern of expenditure on food may not change much, i.e. the Malaysians might not have cut

back on the quantity of food they buy. Basic necessities in general were less elastic compared to other groups of consumption item. It is especially true for the people who were not working at close proximity to their homes so that they could have lunch and dinner at home on working days.

Table 3. **Comparison of Age Group Price Sensitivity by Genders**

Age	Gender		NIED	RIED
20–24	Female	Mean	-5.998	-4.618
		Std. Deviation	14.170	13.319
	Male	Mean	-3.197	-2.004
		Std. Deviation	5.179	4.868
	Overall	Mean	-4.961	-3.662
		Std. Deviation	5.179	4.868
25–29	Female	Mean	-2.192	-1.059
		Std. Deviation	3.514	3.303
	Male	Mean	-2.909	-1.734
		Std. Deviation	4.223	3.969
	Overall	Mean	-2.479	-1.329
		Std. Deviation	3.813	3.584
30–34	Female	Mean	-2.282	-1.144
		Std. Deviation	3.126	2.938
	Male	Mean	-1.725	-0.621
		Std. Deviation	4.394	4.131
	Overall	Mean	-2.074	-0.949
		Std. Deviation	3.629	3.411
35–39	Female	Mean	-2.120	-0.992
		Std. Deviation	5.261	4.945
	Male	Mean	-1.477	-0.387
		Std. Deviation	2.391	2.247
	Overall	Mean	-1.729	-0.625
		Std. Deviation	2.518	2.367
40 and above	Female	Mean	-1.729	-0.625
		Std. Deviation	2.518	2.367
	Male	Mean	-2.006	-0.885
		Std. Deviation	1.976	1.857
	Overall	Mean	-1.865	-0.752
		Std. Deviation	2.250	2.115
Total	Female	Mean	-3.542	-2.328
		Std. Deviation	9.171	8.620
	Male	Mean	-2.530	-1.377
		Std. Deviation	4.183	3.932
	Overall	Mean	-3.129	-1.940
		Std. Deviation	7.555	7.101

In comparison, males were generally less sensitive to prices compared to females. The *NIED* and *RIED* readings for females dwarf that of males by about 1% for both *IEDs*. This could be due to Asian culture where male are commonly the main bread-winners of a family and a large portion of income is already tied up with a certain financial commitment. It is noteworthy that price sensitivity decreases as age of respondents increases up until the age group of 40 and above. This results can be explained by the fact that income in general correlates positively with the year of experiences in career and as wage earner acquire higher salary, they tend to be less sensitive to general increase of prices at the market. The age group of 40 and above

included retirees, thus could explain the increased price sensitivity and their frugality practices in the period of inflation.

Table 4. **Comparison of Price Sensitivity by Ethnic Groups**

Ethnic Group		NIED	RIED
Malay	Mean	-3.750	-2.524
	Std. Deviation	8.632	8.114
Chinese	Mean	-2.844	-1.672
	Std. Deviation	6.988	6.568
Indian	Mean	-1.544	-0.451
	Std. Deviation	3.996	3.756
Others	Mean	-2.106	-0.978
	Std. Deviation	4.321	4.062
Total	Mean	-3.116	-1.928
	Std. Deviation	7.532	7.079

Among the 3 major races in Malaysia, the Indians are found to be the most sensitive to inflation followed by the Chinese while the most price insensitive were the Malays. As shown in Table 4, the *RIED* of the country is -1.9346. Assuming that some fraction of the overall *RIED* is a component of the inaccuracy portrayal of the total CPI, the consumption of the Indian ethnic group which recorded a *RIED* of -0.4504, a value which is significantly below the national's average may indicate that the consumption of this ethnic group has actually gone down.

Table 5. **Comparison of Price Sensitivity by Household Income and Number of Children**

Number of Children		NIED	RIED
0−2	Mean	-2.112	-0.984
	Std. Deviation	3.031	2.849
3 and above	Mean	-2.214	-1.080
	Std. Deviation	2.950	2.773
Total	Mean	-2.148	-1.018
	Std. Deviation	2.993	2.813

The results above show that inflation has forced the married group of respondents with 3 children and above to spend more in the overall nominal term as well as real term. As compared with the group with less than 3 children, this group with more children is more price-sensitive in food and utilities consumption. The result can be interpreted as people with more children are hit harder than those with less because their overall expenditure has increased more than their counterpart even though they are being more price sensitive in their spending on basic necessities.

Conclusion. Inflation denotes an overall rising in the general price level of goods and services in an economy over a period of time. The impact of inflation is various and obvious. The rise in general level of price causes a decrease in the real value of money and other monetary items over time where each unit of currency buys fewer goods and services. Consequently, inflation reflects an erosion in the purchasing power of money – a loss of real value in the internal medium of exchange and unit of account in the economy.

This paper investigated the Malaysian consumer behavior during the six-month period of fuel-induced inflation in the year 2008 which has seen one of the sharpest

increase of CPI in the country's history. Using a set of the survey data that captured the changes in spending pattern before and after inflation, the paper computed the overall income elasticity of demand in real term based on aggregate CPI and then furthered examined the impact of inflation on the spending pattern of the sample in three categories namely food & non-alcohol beverages, housing, water, electricity, gas and other fuels and transport. The paper also detailed the sensitivity of consumers based on their demographic attributes such as ethnic, gender and age.

Overall, the paper has shed some light on the implications and impacts of the recent rise in the cost of living for Malaysians. It can be summarized the Malay ethnic, females and younger generation are less price-sensitive compared to their respective counterparts. This paper hopes to pave an avenue for further research by academia and policy makers in order to find the ways to alleviate the adverse impacts of inflation on the Malaysians.

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