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Regional Consumption Inequalities in Jordan: Empirical Study

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ABSTRACT

The objective of this study is to test regional economic inequalities in Jordan. The methodology has been profoundly influenced by the statistical approach of Analyses Of Variance (ANOVA). This approach tests regional variations in consumption on governorates level. The Least Significant Difference (LSD) test for per capita expenditure is also employed to see where the regional differences occurred. Finally, the test of homogeneity of variances is applied.

By examining the official data on per capita expenditure, this study provides evidence that regional inequalities had increased between 1997 and 2002, emphasizing that the five-years growth period following 1997 have not succeeded in decreasing the economic gap among different regions in Jordan. These results may guide economic policies decision-makers to allocate more resources to certain governorates.

Keywords: Consumption Inequality, Income Inequality, Regional Allocation of Resources.

1. INTRODUCTION

Few studies have discussed inequality in Jordan (Assaf, 1979; Saket, 1983; Abu Jaber *et al*., 1990). These studies focused on the measures of inequality and neglected regional inequality and the factors affecting income distribution. These studies, while addressing income inequality, have never addressed consumption inequality which may be considered a better measure for prosperity inequality. More recent researches on Jordanian data have developed ways to identify the most important determinants of income inequality. Kharabsheh (2001) showed that the demographic and socio-economic factors represented by household size, urban ratio, annual household income, and economic dependency rate were the main determinants that, positively, affect the income inequality in Jordan with a disproportion in the size of effect.

This paper attempts to analyse the variations in regional inequality in Jordan in 1997 and 2002, as measured by variations in consumption expenditure.

The analysis produced interesting results towards inequality levels, especially when several levels of inequality across geographical regions are considered.

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2. METHODOLOGY

This study reviews existing studies on inequality in Jordan[(1)], and examines the raw data provided by the Household Income and Expenditure Survey (HIES) of 1997 and the HIES of 2002/2003. After that, it applies the inequality tests that are consistent in definition; so that to avoid biases resulting from changes in the methodology of deriving inequality measures.

A priori, it is not possible to say whether inequality has increased or decreased by merely comparing the averages of household consumption expenditure or income. In principle, there are more factors, which can be derived from the HIES data, that should be considered to decide whether inequality has increased or decreased. These include, among others, the difference in sample sizes, the standard error, household size, prices, and the change in consumption and income patterns over the two reference periods under study.

Real per capita consumption expenditure[(2)] is used in this research as a welfare measure. It is important to remember how this welfare indicator was derived. It includes 7 consumption expenditures on food, clothing and footwear, housing, transportation, education, health and others. The nominal values of consumption are adjusted according to changes in prices over time. Ideally, each consumption item should be deflated by its specific Consumer Price Index (CPI) taking into account the regional differences in the cost of living, but

unfortunately, these deflators are not available in the Jordanian statistics.

3. SOURCES OF DATA

There are two primary sources of data: the raw data of the Household Income and Expenditure Survey (HIES) of 1997 and the raw data of the HIES of 2002/2003, that were conducted by Jordan's Department of Statistics. Each survey was, according to the Department of Statistics, a representative socioeconomic survey of the living standards of households in all the governorates of Jordan. In both surveys, selected households were observed over a whole year during four rounds; in order to capture seasonal variations in the socio-economic characteristics of the population. Although the surveys were conducted through 5 questionnaires, this research is based on the raw data of Questionnaire Number 2 (Expenditure on Food and Recurrent Goods) and Questionnaire Number 3 (Expenditure on Non-Food Goods). In 1997, the Department of Statistics administered the HIES questionnaires over a 12-month period: 1st January 1997 to 31st December 1997. The final data set consisted of 5,971 households. The 2002/2003 HIES was also administered over a 12-month period: 2nd March 2002 to 3rd March 2003. The final data set consisted of 11,183 households for Questionnaire 2 and 11,479 for Questionnaire 3. However, only 10,027 households replied for the four rounds.

The quality of data raised three issues. The first is concerned with the subset of households with missing data for one or more rounds, especially on consumption expenditure and family size. For this issue, and in order to retain the highest quality of data, a small number of households were excluded from our data set. Accordingly, the sample is composed of all households in the HIES who responded for all of the four rounds. In sum, the selection generates a sample of 5,971 households from the HIES of 1997 and 10,027 households from the HIES of 2002/2003.

The second issue deals with the inclusion or exclusion of some consumption items. For this issue, we have to avoid having any bias in our test. That is, we needed to take into account all food and non-food items which are important in determining the level of welfare of a household.(3)

The third issue is related to regional comparisons prior to 1997. Since the classification of governorates during this period was different from that of 1997 and 2002, it was not possible to make these comparisons for the period prior to 1997.

4. CONSUMPTION VERSUS INCOME INEQUALITY

Macroeconomic research on consumption and income inequality has repeatedly addressed the question of using consumption or income to represent welfare inequality. An old line argued that aggregate personal income fluctuates more than aggregate personal consumption; due to the fact that people can save in good times and borrow in bad times but their consumption, tends to experience fewer changes than income (Atkinson, 1970). Recently, this argument has been emphasized at the micro level. Based on their history of income and needs, households choose to expend on consumption items. In most of the developed countries, applied research provided evidence that household's consumption on the micro level is affected by past history of income. This has been demonstrated by analyzing data for Australia (Barrett, Crossley and Worswick, 1999; Borland, 1998 and Harding, 1995, 1997), Canada (Pendakur, 1998, 2001), Europe (Zaidi and de Vos, 2001), Italy (Costa and Michelini, 1999 and Maltagliati and Michelini, 1999), the United Kingdom (Blundell and Preston, 1996, 1998), and the United States (Cutler and Katz, 1992; Slesnick, 1998, 2001).

In sum, the above empirical studies argued that households do take some steps to smooth consumption; and therefore, consumption inequality is probably a better measure of inequality in welfare or economic resources.

Jordanian HIES provides information concerning annual expenditure on hundreds of consumption items. These expenditures are aggregated, as explained earlier, to 7 commodity groups. However, the question is which expenditures should comprise annual consumption? Ideally, the consumption measure should capture all consumption flows used during the year and should not include any forms of savings or deferred consumption. Consumption flows must include all nondurable expenditures plus the consumption flows from durables. Savings and deferred consumption must include direct savings and also indirect savings such as life insurance premiums, lumpy durable expenditures and so forth. Also, the link between income and consumption is mediated by saving and borrowing decisions, which are determined by past and future needs, risks, and credit market conditions.

Following the above empirical findings in microeconomic research, that favoured consumption to income as a better measure for measuring inequality, this study uses per capita expenditure on consumption to derive measures of inequality.

5. HYPOTHESES OF THE STUDY

Using the raw data provided by the two HIESs, this study tests the hypothesis of no inequality in 1997 and in 2002. All tests are large sample tests that are based essentially on the assumption that per capita consumption is normally distributed.

In this study, there are 16 null hypotheses to be tested, as shown below. Each hypothesis assumes that there are no significant variations in per capita consumption among the governorates. In other words, the study is interested in seeing if there are significant differences in per capita consumption that could be attributed to governorates. A possible model for this problem is to look upon per capita consumption PC_{ijt} as values assumed by independent random variables having normal distributions with the means μ_{it} and the variance σ_t^2. Stating this assumption somewhat differently, the underlying model can be specified by writing

$PC_{ijt} - \mu_{it} = \alpha_{it} + e_{ijt}$ for $i = 1, 2, ..., 12;\ j = 1, 2, ..., n_i;$ and $t=1,2$.

For simplicity, the index t (which refers to time: 1 for 1997 and 2 for 2002) hereafter is omitted, so the model becomes

$PC_{ij} - \mu_i = \alpha_i + e_{ij}$ for $i = 1, 2, ..., 12$ and $j = 1, 2, ..., n_i$.

The null hypothesis that we want to test can, symbolically, be stated as:

$H_0: \alpha_1 = \alpha_2 = ... = \alpha_{12} = 0$

The corresponding alternative hypothesis is that the respective parameters are not all equal to 0, in other words,

$H_1: \alpha_i \neq 0$ for at least one value of i.

Where

$i = 1, 2, ..., 12$ is an index for governorates;

$j = 1, 2, ..., n_i$ is an index for the number of consumption observations;

n_i = number of consumption observations in governorate i;

PC_{ij} = jth per capita consumption in governorate i, in real terms;

μ_i = The arithmetic mean of real per capita consumption in governorate i;

α_i = The effects of the ith governorate;

e_{ij} = Error terms which are assumed to have mean zero and constant variance.

The above test is carried out 16 times, yielding 16 ANOVA tables: 8 for the 1997 data: one for each commodity group and one for the overall consumption. Similar 8 ANOVAs are carried out for the 2002 data.

Obviously, if the null hypothesis is true, the samples for the 12 governorates are really independent random samples from the same population. This implies that the variations in per capita consumption could not be attributed to governorates.

Since it is customary to present the results of an analysis of variance in the form of a summary table, the results of 1997 data are summarised in Table (3) while the results of 2002 data are summarised in Table (4).

This study also applies Levene statistic to test the homogeneity of the variances of per capita consumption expenditures by commodity group. As shown below, the assumption of homogeneity of variances of real per capita consumption has extremely low probabilities. In other words, the variances of real per capita consumption of each commodity group and for the overall expenditure are not homogeneous; which provides statistical evidence that there were significant regional differences among the variances of expenditures. This supports the findings of the study that the governorates had significant variances in per capita consumption. It should be emphasized that the Levene test is carried out to test the homogeneity of per capita consumption. That is for σ^2_{pc} and not for the variances of error terms $\left(\sigma^2_{\varepsilon}\right)$.

6. EMPIRICAL RESULTS

Table (1) shows the distribution of per capita consumption expenditure on each commodity group by governorate in 1997. The largest proportion of expenditure was spent on food, accounting for nearly 47%. This proportion was relatively high in poor regions such as Karak, Mafraq, and Ajloun; while it was low in the relatively richer regions such as Amman. This is due to the fact that per capita income for Amman was the highest among all governorates. Expenditures on housing and transportation were also relatively high accounting for about 27.4% and 8.1% of total expenditures, respectively. Table (1) also shows that high proportions of expenditure on housing were in Amman, Irbid, and Balqa; while lower proportions were in Ajloun and Tafeelah governorates. The proportion of expenditure on

Table 1. Per capita consumption by commodity group and governorate, 1997.

Governorate	Food	Clothing	Housing	Trans-portation	Education	Health	Other	Total
Amman	505.0	72.6	396.3	111.4	38.3	31.7	63.3	1218.7
Balqa	493.1	66.7	271.0	78.7	14.4	23.1	41.8	988.8
Zarka	543.1	77.0	297.7	109.3	35.3	41.5	81.0	1184.8
Madaba	501.4	89.1	314.1	114.1	31.7	19.0	93.2	1162.6
Irbid	470.9	65.9	265.2	55.9	24.9	19.4	65.7	967.9
Mafraq	507.9	55.1	229.0	45.7	12.4	14.4	30.5	895.1
Jerash	545.5	75.5	232.7	60.9	32.5	24.5	61.1	1032.7
Ajloun	612.2	74.1	240.6	86.9	24.7	13.2	56.9	1108.5
Karak	687.4	74.8	265.3	59.4	27.9	22.3	61.3	1198.4
Tafeelah	517.9	72.5	216.3	90.8	21.9	9.0	59.6	988.0
Ma'an	401.5	53.6	192.3	92.1	16.8	14.2	45.1	815.5
Aqaba	617.8	93.7	288.1	86.4	40.3	32.1	87.8	1246.2
Jordan	520.7	72.2	303.1	89.4	30.2	25.6	64.1	1105.3

Note: All figures are in real terms and rounded to the nearest decimal point.

Table 2. Per capita consumption by commodity group and governorate, 2002.

Governorate	Food	Clothing	Housing	Trans-portation	Education	Health	Other	Total
Amman	511.2	59.0	393.2	181.7	72.8	57.3	99.5	1374.8
Balqa	408.2	45.2	223.8	99.3	44.6	21.4	53.4	896.0
Zarka	348.5	37.3	236.9	104.7	27.7	24.8	51.1	831.0
Madaba	426.8	50.1	256.8	131.4	54.1	24.5	61.5	1005.1
Irbid	403.8	49.3	234.4	111.0	42.1	18.1	71.2	929.9
Mafraq	317.7	33.2	175.3	95.2	19.2	11.2	31.5	683.4
Jerash	376.8	47.1	192.1	110.5	49.3	19.7	54.0	849.5
Ajloun	423.7	43.6	174.2	97.7	35.5	5.7	33.7	814.1
Karak	421.0	57.8	232.0	115.3	48.3	15.2	60.3	950.0
Tafeelah	401.7	37.7	209.6	96.3	31.6	12.8	43.3	833.0
Ma'an	376.8	38.2	219.0	111.2	23.5	19.1	44.5	832.3
Aqaba	375.6	47.7	275.7	108.8	34.1	30.7	44.7	917.2
Jordan	425.0	49.1	277.5	130.4	48.4	31.1	68.9	1030.3

Note: All figures are in real terms and rounded to the nearest decimal point.

transportation was relatively high in Ma'an, Madaba, and Tafeelah governorates; and lower than the average in Karak, Mafraq, Ajloun, Aqaba, and Irbid governorates.

Table (2) presents per capita expenditure on each commodity group for each governorate in 2002. As can be noticed, the largest proportion of expenditure consumption was spent on food items; accounting for about 41.3% of total expenditure. This result is not surprising since Jordan is one of the developing countries with a relatively low per capita income. The proportion of expenditure on food items differs between regions. This proportion ranged between 37.2%, the lowest for Amman governorate, and 52%, the highest for Ajloun governorate. This is due to the fact that per capita income for Amman was the highest among all governorates.

Table 3. A summary of ANOVA results for per capita household consumption, 1997.

Commodity group	Source	Sum of Squares	Mean Square	F	Sig.
Food	Between	20623536.0	1874866.9	4.355	.003
	Within	2565127293.5	430462.7		
	Total	2585750829.6			
Clothing	Between	461967.3	41997.0	3.525	.004
	Within	71003543.2	11915.3		
	Total	71465510.5			
Housing	Between	27976988.9	2543362.6	13.827	.000
	Within	1096081456.8	183937.1		
	Total	1124058445.8			
Transportation	Between	3386769.4	307888.1	3.303	.004
	Within	555414956.7	93206.0		
	Total	558801726.2			
Education	Between	440181.1	40016.4	11.350	.000
	Within	21009792.5	3525.7		
	Total	21449973.6			
Health	Between	498981.5	45361.9	5.446	.000
	Within	49630918.7	8328.7		
	Total	50129900.2			
Other	Between	1195060.5	108641.8	4.360	.002
	Within	148468712.5	24915.0		
	Total	149663773.1			
All commodities	Between	99567001.6	9051545.6	4.383	.002
	Within	12306275500.0	2065157.8		
	Total	12405842501.6			

Notes: - Degrees of freedom are: 11 for between, 5,959 for within and 5,970 for total.
- Tabled F ($F_{0.05,10,120} = 1.91$ and $F_{0.05,12,120}=1.83$) is less than any calculated F above, at the 5% level of significance.

Expenditures on housing and transportation commodity groups were also relatively high. These expenditures accounted for about 26.9% and 12.7% of total expenditure, respectively. This indicates that less than 25% of total expenditure is devoted to clothing and footwear, education, health and other miscellaneous commodity groups. Table (2) also shows that there were regional differences in the distribution of expenditure on certain commodity groups. For example, the proportion of expenditure on housing ranged between 21.4% in Ajloun to as high as 30.1% in Aqaba. For transportation expenditures, the high proportions were in Mafraq, Ma'an and Amman while lower proportions were in Balqa and Tafeelah. The proportion of expenditure on health accounted for nearly 0.7% of total expenditure for Ajloun governorate and 4.2% for Amman governorate.

It is worth mentioning that the proportion of expenditure on food, clothing and footwear, and housing decreased between 1997 and 2002. More precisely, the overall ratio of expenditure on food items to total expenditure decreased from 47.1% in 1997 to 41.3% in 2002; while the overall ratio of expenditure on clothing and footwear decreased from 6.5% in 1997 to 4.8% in 2002 and the proportion of expenditure on housing decreased from 27.4% to 26.9% during the same period. This decline is mainly due to the increase of the Jordanian per capita income; as more expenditure was devoted to transportation, education, heath, and other miscellaneous items. This change in the pattern of consumption expenditure is in line with the economic theory which assumes that when income increases; consumption expenditure, in relative terms, is diverted from the main necessities (food, clothing, and shelter) to the less needed necessities.

Table 4. A summary of ANOVA results for per capita household consumption, 2002.

Commodity group	Source	Sum of Squares	Mean Square	F	Sig.
Food	Between	40751891.2	3704717.3	39.323	.000
	Within	943537183.2	94212.4		
	Total	984289074.4			
Clothing	Between	771456.0	70132.3	36.941	.000
	Within	19013359.7	1898.4		
	Total	19784815.7			
Housing	Between	64032875.5	5821170.5	89.055	.000
	Within	654642290.6	65366.1		
	Total	718675166.1			
Transportation	Between	12307941.4	1118903.7	19.194	.002
	Within	583815172.9	58294.0		
	Total	596123114.4			
Education	Between	3384652.8	307695.7	18.674	.002
	Within	165020874.1	16477.3		
	Total	168405527.0			
Health	Between	3294416.8	299492.4	11.333	.003
	Within	264670021.5	26427.3		
	Total	267964438.4			
Other	Between	5274818.7	479528.9	30.137	.000
	Within	159352861.9	15911.4		
	Total	164627680.7			
All commodities	Between	575108459.4	52282587.2	78.573	.000
	Within	6663991745.0	665401.0		
	Total	7239100204.5			

Notes: - Degrees of freedom are: 11 for between, 10,015 for within and 10,026 for total.
- Tabled F ($F_{0.05,10,120}$ = 1.91 and $F_{0.05,12,120}$=1.83) is less than any calculated F above, at the 5% level of significance.

Table 5. A summary of empirical results of LSD of per capita consumption between governorates, 1997.

Governorate	Significant differences with
Amman	Balqa, Irbid, Mafraq, Jerash, Tafeelah, Ma'an
Balqa	Amman, Aqaba
Zarka	Irbid, Mafraq, Ma'an
Madaba	Irbid, Mafraq, Ma'an
Irbid	Amman, Zarka, Madaba, Karak, Aqaba
Mafraq	Amman, Zarka, Madaba, Karak, Aqaba
Jerash	Amman
Ajloun	Ma'an
Karak	Irbid, Mafraq, Ma'an
Tafeelah	Amman, Aqaba
Ma'an	Amman, Zarka, Madaba, Ajloun, Karak, Aqaba
Aqaba	Balqa, Irbid, Mafraq, Tafeelah, Ma'an

Note: Least Significant Difference (LSD) at the 5% level of significance.

Empirical results, presented in Table (3), show that there were statistically significant differences between governorates in consumption inequality in 1997. This applies to each commodity group under study. As can be seen, each value of calculated *F* is less than its corresponding tabled *F* at the 5% level of significance, providing statistical evidence of significant inequalities in the wealth of the governorates. The results of testing variations in consumption expenditure between governorates in 2002, presented in Table (4), also show

Table 6. A summary of empirical results of LSD of per capita consumption between governorates, 2002.

Governorate	Significant differences with
Amman	All other governorates
Balqa	Amman, Madaba, Mafraq
Zarka	Amman, Madaba, Irbid, Mafraq, Karak
Madaba	Amman, Balqa, Zarka, Mafraq, Jerash, Ajloun ,Tafeelah, Ma'an
Irbid	Amman, Zarka, Mafraq, Ajloun, Ma'an
Mafraq	All other governorates
Jerash	Amman, Madaba, Mafraq
Ajloun	Amman, Madaba, Irbid, Mafraq, Karak
Karak	Amman, Zarka, Mafraq, Ajloun, Ma'an
Tafeelah	Amman, Madaba, Mafraq
Ma'an	Amman, Madaba, Irbid, Mafraq, Karak
Aqaba	Amman, Mafraq

Note: Least Significant Difference (LSD) at the 5% level of significance.

Table 7. Test of homogeneity of variances, 1997 and 2002.

Commodity group	1997		2002	
	Levene Statistic	Sig.	Levene Statistic	Sig.
Food	4.269	.002	22.837	.000
Clothing and footwear	6.012	.001	32.071	.000
Housing	19.240	.000	82.490	.000
Transportation	6.121	.001	9.394	.003
Education	13.200	.000	48.293	.000
Health	8.828	.000	17.060	.000
Other	6.704	.001	37.912	.000
All commodities	6.736	.001	68.456	.000

Notes: For 1997, df1=11 and df2=5959;
For 2002, df1=11 and df2=10015;
df = degrees of freedom.

that the null hypothesis (of no inequality between governorates) could not be accepted at the 5% level of significance. This is true for each commodity group. In other words, there were significant inequalities in the wealth of the governorates. Also, the level of significance for each commodity group, shown in the last column of Table (3) and Table (4), is not only less than 5% but also than 1% indicating strong variations.

Looking at the results for different governorates, we see that pooling together all consumption items did not mask differences between these consumption items. This means that not only significant inequalities existed between governorates in each commodity group, but also in the overall consumption expenditure. In particular, consumption inequality was quite strong in expenditures on housing, food, and clothing and footwear while a weak inequality appeared in expenditure on health, education and transportation. The increase in inequality between 1997 and 2002 is obvious for all governorates. All governorates experienced an increase in inequality over this period, as indicated by the respective values of calculated *F* in Tables (3) and (4).

Applying the LSD test[4] to perform all pairwise comparisons between governorates concerning the average of per capita consumption in Jordan, it produced 21 significant differences among governorates in 1997 (i.e., Amman-Balqa, Amman-Irbid, …, Ma'an-Aqaba) and 33 significant differences in 2002 (i.e., Amman-Balqa, Amman-Zarka, …, Karak-Ma'an), as shown in Tables (5) and (6), respectively. This empirical result is another indication of the increasing inequalities between governorates in Jordan.

This study also tests the homogeneity of variances of consumption expenditures by commodity group assuming that these independent groups (variables) are taken from a population with the same variance. Empirical results for 1997, presented in Table (7), show that Levene statistic (4.269 for food, 6.012 for clothing and footwear, 19.240 for housing, etc.) has a significance of 0.2%, 0.0%, 0.1%, etc., respectively. This implies that the assumption of homogeneity of variances of real per capita consumption on these commodity groups has extremely low probabilities. In other words, the variances of real per capita consumption on these commodity groups are not homogeneous. This is also true for each commodity group and for the overall expenditure on consumption in Jordan in 2002. Examining the values of Levene statistic and their corresponding significances provides statistical evidence that there were regional significant differences among the variances of expenditures(5). This applies to each commodity group as all values of the level of significance is below 5%. This can be considered as another indication of inequality between governorates during 1997 and 2002.

7. CONCLUSIONS

This study has concentrated on analyzing inequality in consumption between all governorates in Jordan, for both 1997 and 2002. The objective was to determine whether regional inequalities existed or not. Another objective was to see whether the status of inequality has improved or worsened, and if so, in which governorates.

Empirical results indicate that inequality existed between governorates; implying that poor people are concentrated in some governorates and rich people are concentrated in others.

We can draw four main conclusions from the empirical results presented in this study. First, there has been concrete evidence that not only inequality existed between governorates in Jordan in 1997 and 2002; but also inequality had increased during this period. Second, development policies in Jordan had failed in reducing inequalities between governorates. The results of the tests, while revealing startling evidence concerning inequality in different geographical regions, indicate that economic and social policies; especially these directed toward inequality reduction such as Social Productivity Programme (SPP) that was launched in 1998, Small and Micro Enterprises Development Programme (SMEDP), and Training and Employment Support Programme (TESP) had not succeeded in reducing inequality between the different regions of Jordan. Third, inefficient implementation of economic policies concerning inequality reduction is more likely to fail when there is no regular monitoring, evaluation and revision of economic development programmes and inequality strategy.

Finally, it should be emphasized that, while inequality figures may provide decision makers with a *prima facie* results that could be classified as intuitionism that will most likely cause confusion, statistical tests addressing inequality, as those demonstrated in this study, provide more concrete evidence than just looking at consumption and income figures and drawing vague conclusions.

NOTES

(1) There is hardly any in-depth study on inequality in Jordan. However, few attempts have been made to explore the income distribution and factors affecting it. See, for example Assaf 1979, Saket 1983, Bubeh et al. 1998 and Kharabsheh 2001.

(2) All figures of 2002 are updated to 1997 prices. Real per capita expenditure figures, for 2002, were computed by deflating the nominal expenditure figures with the consumer price index. (1997=100 and 2002=108.2). Consumer price indices are taken from: Central Bank of Jordan. 2004. p. 82.

(3) These include all expenditure items on consumption groups from group 1 to group 15 in HIES Questionnaire 2 and all expenditure items on consumption groups from group 1 to group 17 in Questionnaire 3 of the HIES.

(4) The Least Significant Difference (LSD) uses t tests to perform all pairwise comparisons between group means. No adjustment is made to the error rate for multiple comparisons.

(5) Homogeneity-of-variance test is carried out for real per capita consumption on each commodity group and not for the variances of error terms. This test requires that the dependent variable, which is jper capita consumption here, should be normally distributed. This is true in our study since the number of observations is large, for both 1997 and 2002 data.

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