FOOD CONSUMPTION IN RICH COUNTRIES

by

Wing-Cheong Yuen

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DEPARTMENT OF ECONOMICS

**THE UNIVERSITY OF WESTERN AUSTRALIA
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Abstract

This chapter uses Working's (1943) model to examine food consumption patterns in 24 OECD countries. The results confirm that the food budget share declines with increasing income, which is compatible with Engel's law. The findings also give support to a new empirical law, the strong version of Engel's law (Theil et al., 1989), which states that the food budget share decreases by 10 percentage points when income doubles. The chapter also allows for the effects of prices on food consumption and tabulates the income and price elasticities.

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6.1 INTRODUCTION

The previous chapter showed that food consumption in 42 countries could be well understood in the context of Working's (1943) model. In view of the great income differences between these countries, it is quite an achievement for a simple, two-parameter model to work so well. In this chapter, we use more recent data on food consumption in 24 OECD countries to show that the key elements of the findings of Chapter 5 continue to hold.

This chapter is structured as follows. The new data are discussed in Section 6.2. In the next two sections, we use these data for a preliminary analysis and then in a test of functional form. Section 6.5 uses an extension of Working's model which includes prices to estimate a food demand equation for each country individually, as well as for all countries combined. These estimates are quite similar to those of the previous chapter. Finally, Section 6.6 presents the income and price elasticities implied by the estimates.

6.2 OECD FOOD CONSUMPTION AND WORKING'S MODEL

This chapter uses recent data for 24 OECD countries, obtained from various issues of National Accounts (Department of Economics and Statistics, OECD: Paris), Vol I and II. Table 6.1 summarizes the general characteristics of the database. The countries are ranked in terms of declining per capita income. It can be noted that the US has the highest mean income per capita, while Mexico has the lowest with 29 percent of the US value. The budget share of food (the share of total expenditure devoted to food) can be found in column 5, and we note that the values tend to rise as income falls. This characteristic is consistent with Engel's law.

TABLE 6.1
CHARACTERISTICS OF THE DATABASE

Country	Sample period	Average per capita income (1970-1995)		Mean food budget share (× 100)
		International dollars	With US = 100	
(1)	(2)	(3)	(4)	(5)
1. United States	1960-93	9510	100	12.28
2. Luxembourg	1970-94	8705	91.54	17.49
3. Switzerland	1960-94	8434	88.69	20.99
4. Canada	1960-94	7007	73.68	14.29
5. Iceland	1960-94	6911	72.67	20.17
6. Belgium	1960-94	6855	72.08	20.39
7. France	1963-93	6820	71.71	19.28
8. Japan	1970-94	6417	67.48	23.65
9. Italy	1964-94	6396	67.25	26.24
10. Australia	1960-94	6334	66.60	17.71
11. U.K.	1960-94	6308	66.33	17.16
12. Netherlands	1969-91	6296	66.21	15.50
13. Austria	1964-94	6063	63.75	20.89
14. Denmark	1966-94	5992	63.01	17.63
15. Germany	1960-94	5941	62.47	24.56
16. Sweden	1963-94	5820	61.20	18.82
17. N. Zealand	1982-94	5818	61.18	12.62
18. Norway	1962-91	5722	60.17	21.80
19. Finland	1960-94	5410	56.89	22.56
20. Spain	1964-92	4804	50.51	28.51
21. Greece	1960-94	4507	47.39	36.15
22. Ireland	1970-94	4393	46.19	23.56
23. Portugal	1960-89	3957	41.61	37.69
24. Mexico	1981-93	2755	28.97	36.49
25. Mean		6132	64.48	21.93

Note: Average per capita incomes in international dollars are computed on the basis of the purchasing powers of national currencies, not prevailing exchange rates.

To analyse these data, we follow the previous chapter and employ Working's (1943) model,

$$(2.1) \quad w = \alpha + \beta \log M ,$$

where w is the food budget share and M is total expenditure per capita ("income" for short). The implied income elasticity is $\eta = 1 + \beta/w$. Since w is always positive, food being a necessity implies that $\beta < 0$. As discussed in Section 5.8, previous estimates of the slope parameter β are centred around -0.15 , leading to the strong version of Engel's law, viz., when income doubles, the food budget share declines by 10 percentage points.

6.3 A PRELIMINARY ANALYSIS

In this section we investigate informally the extent to which our data are consistent with the strong version of Engel's law. Consider a journey from country b to country a . From Working's model, the change in food budget share is $\Delta w_{ab} = \beta \Delta \log M_{ab}$, where $\Delta w_{ab} = w_a - w_b$ and $\Delta \log M_{ab} = \log M_a - \log M_b$ for $a, b = 1, \dots, 24$ countries. Let Δw_{ab} and $\Delta \log M_{ab}$ be the $(a, b)^{\text{th}}$ elements of 24×24 matrices, with each matrix containing ${}^{24}C_2 = 24!/(24-2)!2 = 276$ distinct pairs of countries. For example, as the US is the first country and Mexico the twenty fourth, the move from Mexico to the US is represented by the $(1, 24)^{\text{th}}$ element of these matrices. Using the data in columns 3 and 5 of Table 6.1, Tables 6.2 and 6.3 give the matrices of income and food budget share changes¹. The countries in these tables

¹ Note that these matrices omit (i) the diagonal elements ($a = b$), which are zero; and (ii) the lower triangle (the negative of the upper triangle).

TABLE 6.2
MATRIX OF CHANGES IN INCOME FOR 24 OECD COUNTRIES

$\Delta \log M_{ab} \times 100$

Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico	
9	12	31	32	33	33	39	40	41	41	41	45	46	47	49	49	51	56	68	75	77	88	124	United States
	3	22	23	24	24	30	31	32	32	32	36	37	38	40	40	42	48	59	66	68	79	115	Luxembourg
		19	20	21	21	27	28	29	29	29	33	34	35	37	37	39	44	56	63	65	76	112	Switzerland
			1	2	3	9	9	10	11	11	14	16	17	19	19	20	26	38	44	47	57	93	Canada
				1	1	7	8	9	9	9	13	14	15	17	17	19	24	36	43	45	56	92	Iceland
					1	7	7	8	8	9	12	13	14	16	16	18	24	36	42	44	55	91	Belgium
						6	6	7	8	8	12	13	14	16	16	18	23	35	41	44	54	91	France
							0	1	2	2	6	7	8	10	10	11	17	29	35	38	48	85	Japan
								1	1	2	5	7	7	9	9	11	17	29	35	38	48	84	Italy
									0	1	4	6	6	8	8	10	16	28	34	37	47	83	Australia
										0	4	5	6	8	8	10	15	27	34	36	47	83	U.K.
											4	5	6	8	8	10	15	27	33	36	46	83	Netherlands
												1	2	4	4	6	11	23	30	32	43	79	Austria
													1	3	3	5	10	22	28	31	41	78	Denmark
														2	2	4	9	21	28	30	41	77	Germany
															0	2	7	19	26	28	39	75	Sweden
																2	7	19	26	28	39	75	N. Zealand
																	6	17	24	26	37	73	Norway
																		12	18	21	31	67	Finland
																			6	9	19	56	Spain
																				3	13	49	Greece
																					10	47	Ireland
																						36	Portugal

TABLE 6.3

MATRIX OF CHANGES IN THE FOOD BUDGET SHARE FOR 24 OECD COUNTRIES

 $\Delta w_{ab} \times 100$

Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico	
-5	-9	-2	-8	-8	-7	-11	-14	-5	-5	-3	-9	-5	-12	-7	0	-10	-10	-16	-24	-11	-25	-24	United States
	-4	3	-3	-3	-2	-6	-9	0	0	2	-3	0	-7	-1	5	-4	-5	-11	-19	-6	-20	-19	Luxembourg
		7	1	1	2	-3	-5	3	4	5	0	3	-4	2	8	-1	-2	-8	-15	-3	-17	-16	Switzerland
			-6	-6	-5	-9	-12	-3	-3	-1	-7	-3	-10	-5	2	-8	-8	-14	-22	-9	-23	-22	Canada
				0	1	-3	-6	2	3	5	-1	3	-4	1	8	-2	-2	-8	-16	-3	-18	-16	Iceland
					1	-3	-6	3	3	5	-1	3	-4	2	8	-1	-2	-8	-16	-3	-17	-16	Belgium
						-4	-7	2	2	4	-2	2	-5	0	7	-3	-3	-9	-17	-4	-18	-17	France
							-3	6	6	8	3	6	-1	5	11	2	1	-5	-13	0	-14	-13	Japan
								9	9	11	5	9	2	7	14	4	4	-2	-10	3	-11	-10	Italy
									1	2	-3	0	-7	-1	5	-4	-5	-11	-18	-6	-20	-19	Australia
										2	-4	0	-7	-2	5	-5	-5	-11	-19	-6	-21	-19	U.K.
											-5	-2	-9	-3	3	-6	-7	-13	-21	-8	-22	-21	Netherlands
												3	-4	2	8	-1	-2	-8	-15	-3	-17	-16	Austria
													-7	-1	5	-4	-5	-11	-19	-6	-20	-19	Denmark
														6	12	3	2	-4	-12	1	-13	-12	Germany
															6	-3	-4	-10	-17	-5	-19	-18	Sweden
																-9	-10	-16	-24	-11	-25	-24	N. Zealand
																	-1	-7	-14	-2	-16	-15	Norway
																		-6	-14	-1	-15	-14	Finland
																			-8	5	-9	-8	Spain
																				13	-2	0	Greece
																					-14	-13	Ireland
																						1	Portugal

are listed in the order of declining real income per capita from the top to bottom and left to right. For example, the per capita income in Mexico is 2,755 international dollars, while that of the US is 9,510 (see column 3 of Table 1). Thus in moving from Mexico to the US, income changes by $\Delta \log M_{ab} = \log 9,510 - \log 2,755 = 1.24$, as indicated by the first entry in the last column of Table 6.2. Similarly, looking at the first entry in the first row of the table, we can say that the journey from Luxembourg to the US involves an increase in per capita income of about 9 percent. Note that a move from left to right along a given row corresponds to moving from successively poorer countries to a given destination country. It is for this reason that the elements in Table 6.2 increase as we move to the right. As moving up a given column represents a journey from a given source country to successively richer destinations, the elements of the table increase as we head north.

From column 5 of Table 6.1 the food budget share in Mexico is 36 percent, while it is 12 percent in US. Thus, as indicated in the first entry in the last column of Table 6.3, the change in the food budget share associated with the move from Mexico to the US is $\Delta w_{ab} = 12 - 36 = -24$ percentage points. As can be seen, the absolute value of the elements in this table tend to increase as we go (i) from West to East and (ii) from South to North, again because the two countries being compared become further apart on the income ladder.

Note that Working's model (2.1) implies that the ratio $\Delta w_{ab} / \Delta \log M_{ab}$ is the income coefficient of food (β) for countries a and b . Table 6.4 shows upper triangle of the 24×24 matrix of these ratios for all pairs of countries. In contrast with the previous two tables, the elements in Table 6.4 seem to be much more random with no clear pattern. Figure 6.1 presents a frequency distribution of these ratios. As can be seen, the centre of gravity of the

TABLE 6.4

MATRIX OF INCOME COEFFICIENTS FOR FOOD IN 24 OECD COUNTRIES

$$\Delta w_{ab} / \Delta \log M_{ab} \times 100$$

Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico	
-59	-73	-7	-25	-25	-21	-29	-35	-13	-12	-8	-19	-12	-26	-13	-1	-19	-18	-24	-32	-15	-29	-20	United States
	-111	15	-12	-12	-7	-20	-28	-1	1	6	-9	0	-19	-3	12	-10	-11	-19	-28	-9	-26	-17	Luxembourg
		36	4	3	8	-10	-19	11	13	19	0	10	-10	6	23	-2	-4	-13	-24	-4	-22	-14	Switzerland
			-426	-278	-184	-106	-131	-34	-27	-11	-46	-21	-62	-24	9	-37	-32	-38	-50	-20	-41	-24	Canada
				-27	67	-47	-78	28	33	50	-5	18	-29	8	44	-9	-10	-23	-37	-7	-31	-18	Iceland
					217	-49	-84	34	39	57	-4	21	-29	10	47	-8	-9	-23	-38	-7	-31	-18	Belgium
						-72	-108	21	27	47	-14	13	-38	3	42	-14	-14	-26	-41	-10	-34	-19	France
							-790	456	379	428	49	88	-12	49	113	16	6	-17	-35	0	-29	-15	Japan
								876	655	682	100	132	23	79	144	40	22	-8	-28	7	-24	-12	Italy
									134	367	-73	1	-107	-13	60	-40	-31	-39	-54	-16	-42	-23	Australia
										872	-94	-9	-123	-21	56	-48	-35	-42	-56	-18	-44	-23	U.K.
											-143	-43	-156	-42	36	-66	-47	-48	-62	-22	-48	-25	Netherlands
												277	-181	51	200	-16	-15	-33	-51	-8	-39	-20	Austria
													-811	-41	170	-90	-48	-49	-65	-19	-48	-24	Denmark
														279	571	73	21	-19	-42	3	-32	-16	Germany
															18039	-175	-51	-51	-68	-17	-49	-24	Sweden
																-552	-137	-83	-92	-39	-65	-32	N. Zealand
																	-14	-38	-60	-7	-43	-20	Norway
																		-50	-74	-5	-48	-21	Finland
																			-120	55	-47	-14	Spain
																				491	-12	-1	Greece
																					-135	-28	Ireland
																						3	Portugal

276 ratios is given by the range $[-.3, 0]$. As the mid-point of this range is $-.15$, these ratios are in agreement with previous estimates Working's β . On the basis of this preliminary evidence, OECD countries seem to obey the strong version of Engel's law.

FIGURE 6.1
RATIOS OF FOOD BUDGET SHARE CHANGES TO INCOME CHANGES

6.4 MORE EVIDENCE ON WORKING'S MODEL

Since the preliminary analysis provides encouraging results, we investigate further the suitability of Working's model. As discussed in Section 5.3, Laitinen et al. (1983) proposed the following generalized form of Working's model:

$$(4.1) \quad w = \alpha + \beta M^{(\lambda)},$$

where $M^{(\lambda)}$ denotes the transformation of Box and Cox (1964), given by $M^{(\lambda)} = (M^\lambda - 1)/\lambda$. Obviously Working's model is a special case of (4.1) when λ approaches zero. We estimate (4.1) with the data given in Table 6.1 and apply a likelihood ratio test of the null hypothesis $\lambda = 0$ and Table 6.5 gives the results. Since the observed χ^2 value is not significant, we conclude that Working's model is not statistically different from the general Box-Cox case. Therefore, we can have some confidence that Working's model is the correct functional form.

TABLE 6.5
LIKELIHOOD RATIO TEST OF WORKING'S MODEL

Null hypothesis	Log-likelihood values		Test statistic	95% Critical value of $\chi^2(1)$	Outcome
	Working's model	Generalized model			
$\lambda = 0$	41.16	41.45	.58	3.84	Do not reject the null

6.5 ADDING A SUBSTITUTION TERM

As Working's model (2.1) contains only income, it is an incomplete specification of a demand function. Accordingly, we now extend Working's model to incorporate prices. We use Theil's (1980) differential approach together with the assumption of preference independence to endow Working's model with a price term (Clements, 1987). We write p for the price of food and q for the per capita consumption of food. Let $Dx_t = \log x_t - \log x_{t-1}$ be the log-change in

a variable x from year $t-1$ to t , $\bar{w}_t$ be the arithmetic average of the food budget share in $t-1$ and t , $\bar{w}_t = (1/2)(w_t + w_{t-1})$, and DQ_t be the Divisia (1925) volume index of the change in the consumer's real income. The extended version of Working's model is then

$$(5.1) \quad \bar{w}_t(Dq_t - DQ_t) = \beta DQ_t + \phi(\bar{w}_t + \beta)D\tilde{p}_t + \varepsilon_t,$$

where β has the same interpretation as in equation (2.1), viz., the income coefficient; ϕ is the income flexibility (the reciprocal of the income elasticity of the marginal utility of income); $D\tilde{p}_t = Dp_t - DP'_t$ is the change in the relative (or deflated) price of food, with DP'_t the Frisch (1932) price index, $DP'_t = (\bar{w}_t + \beta)Dp_t + (1 - \bar{w}_t - \beta) \times (\log\text{-change in price of non-food})$; and ε_t is a random disturbance term.

Table 6.6 gives the ML-estimates of model (5.1) under the assumption that the disturbances are serially-independent, normally distributed with a constant variance. To allow for the possibility of trend-like changes in tastes, an intercept has been added to (5.1). The first 24 rows of the table gives the individual-country estimates. Looking at row 25, we see that the means of the estimates of β are $-.12$, when there is an intercept, and $-.13$, when the intercept is suppressed. These values are not too far away from $-.15$, the value associated with the strong version of Engel's law. The means of the estimates of the income flexibility ϕ are both $-.7$. In view of the size of the standard errors of these estimates, these values are not inconsistent with previous studies which have found ϕ to be clustered around $-.5$; see Clements and Selvanathan (1994) for a brief survey.

TABLE 6.6

ESTIMATES OF FOOD DEMAND EQUATIONS FOR 24 COUNTRIES

$$\bar{w}_t(Dq_t - DQ_t) = \alpha + \beta DQ_t + \phi(\bar{w}_t + \beta)D\bar{p}_t$$

(Asymptotic standard errors in parentheses)

Country	Intercept $\alpha \times 1000$	Income coefficient β		Income flexibility ϕ	
		With intercept	Without intercept	With intercept	Without intercept
(1)	(2)	(3)	(4)	(5)	(6)
1. United States	-1.671 (.733)	-.056 (.026)	-.100 (.017)	-.351 (.198)	-.560 (.504)
2. Luxembourg	-.945 (.730)	-.159 (.020)	-.184 (.011)	-.667 (.230)	-.493 (.391)
3. Switzerland	-1.110 (.505)	-.029 (.022)	-.063 (.017)	-.575 (.139)	-.636 (.182)
4. Canada	-1.442 (.461)	-.052 (.014)	-.082 (.011)	-.975 (.107)	-1.231 (.167)
5. Iceland	1.685 (1.684)	-.123 (.019)	-.115 (.018)	-1.838 (.444)	-1.714 (.372)
6. Belgium	-.172 (1.133)	-.116 (.033)	-.121 (.018)	-.514 (.295)	-.525 (.303)
7. France	-.949 (.896)	-.089 (.029)	-.116 (.015)	-.233 (.216)	-.309 (.295)
8. Japan	-1.495 (1.205)	-.118 (.036)	-.159 (.016)	-.656 (.365)	-1.115 (.380)
9. Italy	.088 (1.088)	-.140 (.025)	-.139 (.014)	-.474 (.287)	-.478 (.270)
10. Australia	.994 (.542)	-.140 (.015)	-.117 (.014)	-1.182 (.418)	-.913 (.275)
11. U.K.	-1.478 (.527)	-.091 (.016)	-.119 (.012)	-.734 (.225)	-.665 (.331)
12. Netherlands	1.333 (.533)	-.162 (.020)	-.150 (.016)	.411 (.413)	-.110 (.471)
13. Austria	.534 (1.245)	-.116 (.034)	-.104 (.020)	.135 (.353)	.067 (.293)
14. Denmark	-.131 (.768)	-.117 (.024)	-.120 (.018)	-.836 (.306)	-.838 (.310)
15. Germany	-1.270 (.978)	-.095 (.026)	-.122 (.015)	-.858 (.266)	-.834 (.310)
16. Sweden	-.646 (.573)	-.116 (.021)	-.130 (.015)	-.880 (.332)	-1.006 (.417)
17. N. Zealand	-.578 (.633)	-.052 (.024)	-.042 (.026)	-1.040 (.390)	-1.079 (.447)
18. Norway	-.239 (.650)	-.106 (.019)	-.110 (.014)	-.383 (.184)	-.385 (.187)
19. Finland	.578 (1.699)	-.200 (.034)	-.188 (.023)	-1.172 (.921)	-.968 (.855)
20. Spain	-5.734 (1.780)	-.027 (.046)	-.127 (.04)	-.442 (.131)	-.478 (.252)
21. Greece	-.696 (2.067)	-.168 (.050)	-.154 (.030)	-.055 (.246)	-.062 (.230)
22. Ireland	.903 (1.835)	-.182 (.042)	-.169 (.031)	-1.537 (.710)	-1.37 (.454)
23. Portugal	-.709 (2.794)	-.180 (.043)	-.185 (.038)	-.694 (.155)	-.704 (.150)
24. Mexico	1.074 (1.398)	-.120 (.036)	-.120 (.036)	-.179 (.239)	-.246 (.216)
25. Mean	-.458 (1.102)	-.115 (.028)	-.126 (.020)	-.655 (.315)	-.694 (.336)
26. All countries	-.545 (.251)	-.118 (.006)	-.126 (.004)	-.787 (.040)	-.790 (.041)

Next, we combine all countries by applying (5.1) to the pooled data and row 26 contains the results. As can be seen, these results are not appreciably different to the individual country means of row 25.

6.6 IMPLICATIONS

In this section we examine the income and the price sensitivity of the demand for food at various levels of income by analysing the income and the price elasticities.

For country c and year t , the income elasticity implied by (5.1) is $\eta_t^c = 1 + \hat{\beta}^c / \bar{w}_t^c$, where $\hat{\beta}^c$ is the ML-estimate of β . Table 6.7 presents these elasticities. As can be seen, all values are less than one, so that food is always a necessity. However, 47 out of the 692 entries (or 7 percent) of the elasticities are negative. Taken literally, this means that food is an inferior good in these instances. As the assumption of preference independence, which underlies model (5.1), is inconsistent with an inferior good (see, e.g., Clements, 1987), a further investigation of these cases may be needed; but since our focus is to provide an overall picture of food consumption patterns in OECD countries, we shall not pursue this matter here. (For a related discussion, see Section 5.7.) A second important feature of Table 6.6 is that higher income tends to lead to a lowering of the food income elasticity. This can be seen (i) for a given country as we move forward in time; and (ii) as we move from poorer to richer countries.

Next, we consider three different types of own-price elasticities for food: Frisch, Slutsky and Cournot. The Frisch elasticity holds constant the marginal utility of income; the Slutsky

TABLE 6.7

FOOD INCOME ELASTICITIES IN 24 OECD COUNTRIES

Year	United States	Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico
1961	.43	-	.75	.56	.54	.56	-	-	-	.51	.51	-	-	-	.63	-	-	-	.47	-	.63	-	.59	-
1962	.41	-	.74	.56	.54	.56	-	-	-	.50	.50	-	-	-	.62	-	-	-	.45	-	.63	-	.59	-
1963	.37	-	.74	.55	.52	.55	-	-	-	.48	.49	-	-	-	.62	-	-	.57	.38	-	.63	-	.59	-
1964	.35	-	.73	.54	.53	.54	.54	-	-	.47	.47	-	-	-	.61	.46	-	.58	.33	-	.62	-	.59	-
1965	.34	-	.73	.54	.53	.53	.54	-	.61	.47	.46	-	.63	-	.61	.45	-	.58	.33	.67	.62	-	.59	-
1966	.34	-	.73	.53	.51	.52	.53	-	.61	.46	.45	-	.62	-	.60	.44	-	.57	.31	.67	.63	-	.58	-
1967	.33	-	.73	.52	.49	.52	.52	-	.60	.45	.44	-	.61	.44	.60	.43	-	.56	.28	.66	.62	-	.59	-
1968	.32	-	.72	.50	.50	.51	.51	-	.59	.43	.43	-	.60	.43	.59	.41	-	.55	.27	.65	.61	-	.56	-
1969	.30	-	.72	.49	.53	.50	.49	-	.58	.40	.41	-	.59	.42	.57	.39	-	.54	.26	.64	.60	-	.55	-
1970	.30	-	.71	.48	.53	.50	.48	-	.58	.38	.41	.34	.60	.41	.55	.38	-	.54	.24	.62	.58	-	.55	-
1971	.28	.22	.71	.48	.48	.49	.46	.47	.57	.37	.40	.31	.59	.41	.54	.37	-	.54	.23	.61	.57	.37	.53	-
1972	.25	.19	.70	.47	.44	.47	.45	.45	.56	.35	.37	.29	.57	.40	.53	.36	-	.53	.21	.60	.56	.35	.52	-
1973	.23	.18	.70	.46	.44	.45	.44	.43	.55	.34	.35	.25	.56	.39	.52	.35	-	.52	.18	.60	.57	.36	.51	-
1974	.25	.15	.70	.46	.42	.43	.42	.43	.55	.32	.35	.18	.55	.39	.51	.33	-	.51	.13	.60	.58	.38	.47	-
1975	.23	.10	.70	.46	.42	.42	.40	.44	.53	.28	.35	.13	.53	.37	.50	.31	-	.51	.14	.60	.58	.39	.49	-
1976	.21	.08	.69	.44	.46	.42	.39	.44	.52	.27	.34	.11	.52	.34	.49	.30	-	.50	.15	.60	.57	.40	.52	-
1977	.22	.07	.69	.41	.44	.40	.38	.43	.51	.28	.35	.10	.50	.34	.48	.31	-	.48	.16	.59	.56	.38	.51	-
1978	.19	.05	.69	.40	.40	.37	.38	.40	.51	.29	.35	.06	.49	.34	.47	.31	-	.47	.16	.57	.56	.35	.49	-
1979	.16	.00	.69	.41	.38	.34	.37	.37	.50	.29	.32	.02	.49	.32	.46	.30	-	.46	.13	.54	.56	.34	.48	-
1980	.14	-.06	.69	.41	.38	.32	.35	.35	.47	.30	.29	-.01	.48	.30	.45	.28	-	.46	.11	.52	.58	.34	.46	-
1981	.11	-.11	.69	.40	.37	.29	.34	.35	.44	.29	.26	.00	.47	.32	.45	.27	-	.46	.10	.51	.59	.32	.44	-
1982	.08	-.12	.69	.39	.31	.29	.33	.34	.43	.29	.23	.02	.46	.32	.45	.28	-	.46	.10	.51	.59	.32	.44	.66
1983	.04	-.13	.68	.37	.33	.32	.33	.32	.42	.30	.20	.01	.45	.31	.45	.29	.69	.45	.09	.51	.58	.33	.45	.66
1984	-.04	-.14	.69	.35	.36	.33	.35	.31	.40	.28	.18	.01	.44	.29	.43	.30	.68	.43	.07	.51	.57	.32	.46	.68
1985	-.56	-.17	.69	.34	.36	.33	.35	.29	.38	.26	.15	.00	.43	.28	.42	.29	.67	.42	.05	.48	.56	.29	.47	.69
1986	-.07	-.21	.69	.32	.35	.32	.31	.27	.35	.26	.11	-.02	.42	.24	.41	.28	.67	.41	.02	.44	.55	.22	.43	.69
1987	-.10	-.27	.69	.30	.30	.30	.30	.24	.32	.24	.07	-.12	.40	.21	.40	.25	.67	.41	-.01	.43	.54	.18	.38	.69
1988	-.13	-.35	.68	.28	.31	.28	.28	.21	.29	.22	.01	-.23	.38	.20	.39	.22	.66	.41	-.07	.40	.53	.16	.35	.69
1989	-.25	-.42	.68	.25	.35	.25	.27	.18	.26	.20	-.03	-.24	.37	.21	.39	.20	.66	.41	-.12	.37	.52	.14	.32	.68
1990	-.13	-.49	.67	.24	.37	.22	.26	.16	.24	.19	-.04	-.26	.37	.20	.39	.19	.66	.41	-.17	.35	.51	.12	-	.67
1991	-.13	-.57	.67	.23	.34	.20	.25	.15	.22	.19	-.04	-.29	.36	.19	.38	.16	.67	.40	-.19	.33	.50	.11	-	.66
1992	-.16	-	.66	.23	.33	.18	.24	.14	.20	.19	-.05	-.32	.35	.20	.37	.10	.66	-	-.18	.30	.49	.11	-	.65
1993	-.21	-	.65	.22	.34	.14	.22	.13	.19	.19	-.08	-.34	.34	.19	.35	.08	.66	-	-.18	-	.48	.10	-	.64
1994	-	-	.65	.21	.32	.11	-	.11	.19	.21	-.11	-.37	.31	.16	.32	.09	.65	-	-.20	-	.49	.07	-	-
Mean	.09	-.13	.67	.38	.39	.35	.35	.28	.41	.29	.23	-.04	.45	.28	.46	.27	.64	.46	.09	.50	.54	.24	.47	.64

elasticity (or the compensated elasticity) holds real income constant; and the Cournot elasticity (or the uncompensated elasticity) holds money income constant. The Frisch elasticity implied by (5.1) is $F_i^c = \hat{\phi}^c \eta_i^c$, where $\hat{\phi}^c$ is the ML-estimate of the income flexibility for country c and η_i^c is the food income elasticity. The Slutsky elasticity takes the form $S_i^c = F_i^c (1 - \bar{w}_i^c - \hat{\beta}^c)$ and the Cournot own-price elasticity is $C_i^c = S_i^c - (\bar{w}_i^c + \hat{\beta}^c)$. From these definitions, it can be shown that $|C| > |F| > |S|$.

We compute these elasticities with the $\hat{\beta}^c$ and $\hat{\phi}^c$ given in columns 4 and 6 of Table 6.6, the income elasticities given in Table 6.7 and the observed values of the budget shares $\bar{w}_i^c$. The results are contained in Tables 6.8 - 6.10. All the elasticities are less than one in absolute value, implying that food demand is price inelastic. About 90 percent of the price elasticities are negative, with the positive values corresponding to negative income elasticities (except for Austria, where the income flexibility is positive). There is a tendency for all the elasticities to decline in absolute value with increasing income, which is consistent with Timmer's (1981) proposition. This tendency is particularly pronounced with the Cournot elasticity--as the food budget share falls with increasing income, the magnitude of the income effect of the price change declines.

TABLE 6.8

FRISCH OWN-PRICE ELASTICITIES OF FOOD IN 24 OECD COUNTRIES

Year	United States	Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico
1961	-.24	-	-.47	-.69	-.93	-.29	-	-	-	-.46	-.34	-	-	-	-.53	-	-	-	-.62	-	-.04	-	-.42	-
1962	-.23	-	-.47	-.69	-.92	-.29	-	-	-	-.45	-.33	-	-	-	-.52	-	-	-	-.61	-	-.04	-	-.41	-
1963	-.21	-	-.47	-.68	-.90	-.29	-	-	-	-.44	-.33	-	-	-	-.52	-	-	-.22	-.57	-	-.04	-	-.42	-
1964	-.19	-	-.47	-.67	-.92	-.28	-.17	-	-	-.43	-.32	-	-	-	-.51	-.46	-	-.22	-.53	-	-.04	-	-.42	-
1965	-.19	-	-.47	-.66	-.91	-.28	-.17	-	-.29	-.43	-.31	-	.43	-	-.51	-.45	-	-.22	-.53	-.32	-.04	-	-.41	-
1966	-.19	-	-.47	-.65	-.87	-.28	-.16	-	-.29	-.42	-.30	-	.42	-	-.50	-.44	-	-.22	-.52	-.32	-.04	-	-.41	-
1967	-.19	-	-.46	-.64	-.84	-.27	-.16	-	-.29	-.41	-.29	-	.41	-.37	-.50	-.43	-	-.22	-.50	-.31	-.04	-	-.41	-
1968	-.18	-	-.46	-.62	-.86	-.27	-.16	-	-.28	-.39	-.28	-	.40	-.36	-.49	-.41	-	-.21	-.49	-.31	-.04	-	-.40	-
1969	-.17	-	-.46	-.60	-.91	-.26	-.15	-	-.28	-.37	-.27	-	.40	-.35	-.47	-.39	-	-.21	-.48	-.30	-.04	-	-.39	-
1970	-.17	-	-.45	-.60	-.91	-.26	-.15	-	-.28	-.35	-.27	-.04	.40	-.35	-.46	-.38	-	-.21	-.47	-.30	-.04	-	-.39	-
1971	-.16	-.11	-.45	-.59	-.82	-.26	-.14	-.52	-.27	-.33	-.26	-.03	.40	-.35	-.45	-.37	-	-.21	-.47	-.29	-.04	-.51	-.37	-
1972	-.14	-.10	-.45	-.58	-.75	-.25	-.14	-.50	-.27	-.32	-.25	-.03	.39	-.33	-.44	-.37	-	-.21	-.45	-.29	-.03	-.48	-.36	-
1973	-.13	-.09	-.44	-.57	-.75	-.24	-.14	-.48	-.26	-.31	-.23	-.03	.38	-.33	-.43	-.35	-	-.20	-.43	-.29	-.04	-.49	-.36	-
1974	-.14	-.07	-.44	-.57	-.72	-.23	-.13	-.48	-.26	-.29	-.23	-.02	.37	-.33	-.42	-.33	-	-.20	-.40	-.29	-.04	-.52	-.33	-
1975	-.13	-.05	-.44	-.57	-.72	-.22	-.12	-.49	-.26	-.26	-.23	-.01	.35	-.31	-.41	-.31	-	-.20	-.40	-.29	-.04	-.54	-.34	-
1976	-.12	-.04	-.44	-.54	-.78	-.22	-.12	-.49	-.25	-.24	-.23	-.01	.35	-.29	-.41	-.30	-	-.19	-.41	-.29	-.04	-.54	-.36	-
1977	-.12	-.04	-.44	-.51	-.76	-.21	-.12	-.47	-.25	-.25	-.23	-.01	.34	-.29	-.40	-.31	-	-.18	-.42	-.28	-.03	-.52	-.36	-
1978	-.11	-.02	-.44	-.50	-.69	-.19	-.12	-.45	-.24	-.26	-.23	-.01	.33	-.29	-.39	-.31	-	-.18	-.42	-.27	-.03	-.48	-.34	-
1979	-.09	.00	-.44	-.50	-.65	-.18	-.11	-.41	-.24	-.27	-.21	.00	.33	-.27	-.38	-.30	-	-.18	-.40	-.26	-.03	-.47	-.33	-
1980	-.08	.03	-.44	-.50	-.65	-.17	-.11	-.39	-.22	-.27	-.19	.00	.32	-.25	-.37	-.28	-	-.18	-.39	-.25	-.04	-.47	-.32	-
1981	-.06	.05	-.44	-.49	-.63	-.15	-.10	-.39	-.21	-.27	-.17	.00	.32	-.27	-.38	-.27	-	-.18	-.38	-.25	-.04	-.43	-.31	-
1982	-.05	.06	-.44	-.48	-.54	-.15	-.10	-.38	-.21	-.26	-.15	.00	.31	-.27	-.38	-.28	-	-.18	-.38	-.25	-.04	-.44	-.31	-.16
1983	-.02	.06	-.44	-.46	-.56	-.17	-.10	-.36	-.20	-.27	-.13	.00	.30	-.26	-.37	-.29	-.74	-.17	-.37	-.25	-.04	-.45	-.32	-.16
1984	.02	.07	-.44	-.44	-.62	-.18	-.11	-.35	-.19	-.26	-.12	.00	.29	-.25	-.36	-.30	-.73	-.17	-.36	-.25	-.04	-.44	-.33	-.17
1985	.32	.08	-.44	-.41	-.62	-.17	-.11	-.33	-.18	-.24	-.10	.00	.29	-.23	-.35	-.29	-.73	-.16	-.35	-.23	-.03	-.39	-.33	-.17
1986	.04	.10	-.44	-.39	-.60	-.17	-.10	-.31	-.17	-.24	-.07	.00	.28	-.20	-.34	-.28	-.72	-.16	-.33	-.21	-.03	-.30	-.30	-.17
1987	.06	.13	-.44	-.37	-.51	-.16	-.09	-.27	-.15	-.22	-.04	.01	.27	-.17	-.33	-.25	-.72	-.16	-.31	-.20	-.03	-.25	-.26	-.17
1988	.07	.17	-.43	-.35	-.52	-.14	-.09	-.24	-.14	-.20	-.01	.03	.26	-.17	-.33	-.22	-.72	-.16	-.27	-.19	-.03	-.22	-.25	-.17
1989	.14	.21	-.43	-.31	-.60	-.13	-.08	-.20	-.12	-.19	.02	.03	.25	-.18	-.32	-.20	-.71	-.16	-.23	-.18	-.03	-.19	-.23	-.17
1990	.07	.24	-.43	-.29	-.63	-.11	-.08	-.18	-.11	-.18	.03	.03	.25	-.17	-.33	-.19	-.72	-.16	-.20	-.17	-.03	-.17	-	-.17
1991	.07	.28	-.42	-.28	-.59	-.11	-.08	-.17	-.10	-.17	.03	.03	.24	-.16	-.32	-.16	-.72	-.16	-.19	-.16	-.03	-.15	-	-.16
1992	.09	-	-.42	-.28	-.56	-.09	-.07	-.16	-.10	-.17	.03	.03	.24	-.17	-.30	-.10	-.72	-	-.20	-.14	-.03	-.15	-	-.16
1993	.12	-	-.41	-.27	-.58	-.08	-.07	-.14	-.09	-.18	.05	.04	.23	-.16	-.29	-.08	-.71	-	-.20	-	-.03	-.14	-	-.16
1994	-	-	-.41	-.26	-.55	-.06	-	-.13	-.09	-.19	.07	.04	.21	-.14	-.27	-.09	-.70	-	-.19	-	-.03	-.10	-	-
Mean	-.07	.05	-.44	-.50	-.72	-.20	-.12	-.34	-.21	-.29	-.17	.00	.32	-.26	-.41	-.30	-.72	-.19	-.40	-.25	-.04	-.37	-.35	-.17

TABLE 6.9

SLUTSKY OWN-PRICE ELASTICITIES OF FOOD IN 24 OECD COUNTRIES

Year	United States	Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico
1961	-.22	-	-.44	-.64	-.86	-.27	-	-	-	-.43	-.31	-	-	-	-.49	-	-	-	-.57	-	-.04	-	-.38	-
1962	-.21	-	-.44	-.64	-.85	-.27	-	-	-	-.42	-.31	-	-	-	-.48	-	-	-	-.56	-	-.04	-	-.38	-
1963	-.19	-	-.43	-.63	-.83	-.27	-	-	-	-.40	-.30	-	-	-	-.48	-	-	-.20	-.52	-	-.04	-	-.39	-
1964	-.18	-	-.43	-.62	-.85	-.26	-.16	-	-	-.40	-.29	-	-	-	-.47	-.43	-	-.21	-.49	-	-.04	-	-.39	-
1965	-.18	-	-.43	-.61	-.84	-.26	-.15	-	-.27	-.39	-.28	-	.39	-	-.47	-.42	-	-.21	-.49	-.30	-.04	-	-.38	-
1966	-.18	-	-.43	-.60	-.80	-.25	-.15	-	-.27	-.39	-.28	-	.39	-	-.46	-.41	-	-.20	-.48	-.30	-.04	-	-.38	-
1967	-.17	-	-.43	-.59	-.78	-.25	-.15	-	-.27	-.38	-.27	-	.38	-.34	-.46	-.40	-	-.20	-.46	-.29	-.04	-	-.38	-
1968	-.16	-	-.43	-.57	-.80	-.25	-.14	-	-.26	-.36	-.26	-	.37	-.34	-.45	-.38	-	-.20	-.46	-.29	-.03	-	-.37	-
1969	-.16	-	-.42	-.55	-.85	-.24	-.14	-	-.26	-.34	-.25	-	.37	-.32	-.44	-.36	-	-.19	-.45	-.28	-.03	-	-.36	-
1970	-.15	-	-.42	-.55	-.84	-.24	-.14	-	-.25	-.32	-.25	-.03	.37	-.32	-.43	-.35	-	-.19	-.44	-.28	-.03	-	-.36	-
1971	-.15	-.10	-.42	-.55	-.76	-.24	-.13	-.48	-.25	-.31	-.24	-.03	.37	-.32	-.42	-.35	-	-.19	-.43	-.27	-.03	-.47	-.35	-
1972	-.13	-.09	-.41	-.54	-.69	-.23	-.13	-.46	-.25	-.30	-.23	-.03	.36	-.31	-.41	-.34	-	-.19	-.42	-.27	-.03	-.44	-.34	-
1973	-.12	-.08	-.41	-.53	-.69	-.22	-.13	-.44	-.24	-.29	-.22	-.03	.35	-.31	-.40	-.33	-	-.19	-.40	-.27	-.03	-.46	-.33	-
1974	-.13	-.07	-.41	-.53	-.66	-.21	-.12	-.44	-.24	-.27	-.22	-.02	.34	-.30	-.39	-.31	-	-.18	-.37	-.27	-.03	-.48	-.31	-
1975	-.12	-.05	-.41	-.53	-.67	-.20	-.11	-.45	-.24	-.24	-.21	-.01	.33	-.28	-.38	-.29	-	-.18	-.37	-.27	-.03	-.50	-.32	-
1976	-.11	-.04	-.41	-.50	-.72	-.20	-.11	-.45	-.23	-.23	-.21	-.01	.32	-.27	-.38	-.28	-	-.18	-.38	-.27	-.03	-.50	-.34	-
1977	-.11	-.03	-.41	-.47	-.71	-.19	-.11	-.44	-.23	-.24	-.22	-.01	.31	-.27	-.37	-.29	-	-.17	-.39	-.26	-.03	-.49	-.33	-
1978	-.10	-.02	-.41	-.46	-.64	-.18	-.11	-.42	-.22	-.24	-.21	-.01	.30	-.26	-.36	-.28	-	-.17	-.39	-.25	-.03	-.45	-.32	-
1979	-.08	.00	-.40	-.47	-.60	-.17	-.10	-.38	-.22	-.25	-.19	.00	.31	-.25	-.35	-.27	-	-.17	-.37	-.24	-.03	-.43	-.31	-
1980	-.07	.03	-.40	-.46	-.60	-.15	-.10	-.36	-.21	-.25	-.18	.00	.30	-.23	-.35	-.26	-	-.16	-.36	-.23	-.03	-.43	-.30	-
1981	-.06	.05	-.40	-.45	-.58	-.14	-.10	-.36	-.19	-.25	-.16	.00	.29	-.25	-.35	-.25	-	-.16	-.35	-.23	-.03	-.40	-.29	-
1982	-.04	.06	-.40	-.45	-.50	-.14	-.09	-.35	-.19	-.24	-.14	.00	.29	-.25	-.35	-.26	-	-.16	-.35	-.23	-.03	-.40	-.29	-.15
1983	-.02	.06	-.40	-.43	-.52	-.15	-.09	-.33	-.19	-.25	-.12	.00	.28	-.24	-.34	-.27	-.69	-.16	-.34	-.23	-.03	-.42	-.29	-.15
1984	.02	.07	-.40	-.40	-.57	-.16	-.10	-.32	-.18	-.24	-.11	.00	.27	-.23	-.33	-.28	-.68	-.15	-.33	-.23	-.03	-.41	-.30	-.15
1985	.29	.08	-.40	-.38	-.58	-.16	-.10	-.30	-.17	-.22	-.09	.00	.27	-.21	-.32	-.27	-.67	-.15	-.32	-.21	-.03	-.36	-.31	-.16
1986	.04	.09	-.40	-.36	-.55	-.15	-.09	-.28	-.16	-.22	-.07	.00	.26	-.18	-.32	-.26	-.67	-.15	-.31	-.20	-.03	-.28	-.28	-.16
1987	.05	.12	-.40	-.35	-.47	-.15	-.09	-.25	-.14	-.21	-.04	.01	.25	-.16	-.31	-.23	-.67	-.15	-.28	-.19	-.03	-.23	-.24	-.16
1988	.07	.16	-.40	-.32	-.48	-.13	-.08	-.22	-.13	-.19	-.01	.02	.24	-.16	-.30	-.21	-.66	-.15	-.25	-.18	-.03	-.20	-.23	-.16
1989	.13	.19	-.40	-.29	-.55	-.12	-.08	-.19	-.11	-.17	.02	.02	.23	-.16	-.30	-.19	-.66	-.15	-.22	-.16	-.03	-.17	-.21	-.15
1990	.07	.22	-.39	-.27	-.58	-.11	-.07	-.17	-.10	-.16	.03	.03	.23	-.16	-.30	-.18	-.66	-.15	-.19	-.15	-.03	-.16	-	-.15
1991	.07	.26	-.39	-.26	-.55	-.10	-.07	-.16	-.10	-.16	.02	.03	.22	-.15	-.29	-.15	-.66	-.14	-.18	-.15	-.03	-.14	-	-.15
1992	.08	-	-.39	-.26	-.52	-.09	-.07	-.15	-.09	-.16	.03	.03	.22	-.15	-.28	-.09	-.66	-	-.18	-.13	-.03	-.14	-	-.15
1993	.11	-	-.38	-.25	-.54	-.07	-.06	-.13	-.09	-.16	.05	.03	.21	-.15	-.27	-.08	-.66	-	-.18	-	-.03	-.13	-	-.15
1994	-	-	-.38	-.24	-.51	-.05	-	-.12	-.08	-.17	.07	.04	.19	-.13	-.25	-.08	-.65	-	-.17	-	-.03	-.09	-	-
Mean	-.06	.04	-.41	-.46	-.66	-.19	-.11	-.32	-.19	-.27	-.16	.00	.30	-.24	-.38	-.27	-.67	-.17	-.37	-.24	-.03	-.34	-.33	-.15

TABLE 6.10

COURNOT OWN-PRICE ELASTICITIES OF FOOD IN 24 OECD COUNTRIES

Year	United States	Luxembourg	Switzerland	Canada	Iceland	Belgium	France	Japan	Italy	Australia	U. K.	Netherlands	Austria	Denmark	Germany	Sweden	N. Zealand	Norway	Finland	Spain	Greece	Ireland	Portugal	Mexico
1961	-.30	-	-.62	-.75	-1.00	-.42	-	-	-	-.55	-.44	-	-	-	-.70	-	-	-	-.80	-	-.30	-	-.65	-
1962	-.28	-	-.62	-.74	-.98	-.42	-	-	-	-.53	-.43	-	-	-	-.68	-	-	-	-.78	-	-.30	-	-.64	-
1963	-.25	-	-.61	-.73	-.95	-.42	-	-	-	-.51	-.42	-	-	-	-.67	-	-	-.35	-.70	-	-.29	-	-.66	-
1964	-.23	-	-.61	-.72	-.98	-.40	-.29	-	-	-.50	-.40	-	-	-	-.67	-.54	-	-.35	-.64	-	-.29	-	-.66	-
1965	-.23	-	-.61	-.71	-.97	-.39	-.29	-	-.48	-.50	-.38	-	.21	-	-.66	-.52	-	-.36	-.64	-.56	-.29	-	-.64	-
1966	-.23	-	-.61	-.69	-.92	-.39	-.28	-	-.48	-.49	-.37	-	.21	-	-.65	-.51	-	-.35	-.62	-.56	-.29	-	-.64	-
1967	-.22	-	-.60	-.68	-.89	-.39	-.27	-	-.48	-.47	-.37	-	.22	-.44	-.64	-.49	-	-.34	-.60	-.54	-.29	-	-.64	-
1968	-.21	-	-.59	-.65	-.91	-.38	-.26	-	-.46	-.45	-.35	-	.22	-.43	-.62	-.47	-	-.33	-.59	-.52	-.27	-	-.61	-
1969	-.20	-	-.58	-.63	-.98	-.37	-.25	-	-.45	-.42	-.34	-	.22	-.41	-.60	-.45	-	-.32	-.57	-.50	-.27	-	-.58	-
1970	-.20	-	-.58	-.63	-.97	-.36	-.24	-	-.44	-.40	-.33	-.11	.22	-.40	-.58	-.43	-	-.32	-.56	-.49	-.25	-	-.59	-
1971	-.18	-.15	-.57	-.62	-.87	-.35	-.23	-.62	-.43	-.38	-.32	-.10	.22	-.40	-.56	-.42	-	-.33	-.55	-.47	-.23	-.57	-.56	-
1972	-.16	-.13	-.56	-.61	-.78	-.33	-.22	-.59	-.42	-.36	-.30	-.09	.22	-.39	-.55	-.41	-	-.32	-.53	-.46	-.23	-.54	-.53	-
1973	-.15	-.12	-.56	-.60	-.78	-.32	-.22	-.56	-.42	-.35	-.28	-.08	.21	-.38	-.53	-.40	-	-.31	-.50	-.46	-.24	-.55	-.52	-
1974	-.16	-.10	-.56	-.60	-.75	-.30	-.20	-.56	-.41	-.33	-.28	-.05	.21	-.38	-.52	-.37	-	-.30	-.46	-.46	-.25	-.58	-.47	-
1975	-.15	-.07	-.56	-.60	-.75	-.29	-.19	-.57	-.40	-.29	-.28	-.04	.21	-.35	-.50	-.34	-	-.29	-.46	-.46	-.24	-.60	-.50	-
1976	-.13	-.05	-.55	-.57	-.82	-.29	-.18	-.57	-.38	-.27	-.27	-.03	.21	-.33	-.49	-.34	-	-.29	-.48	-.46	-.24	-.62	-.54	-
1977	-.14	-.05	-.55	-.53	-.80	-.28	-.18	-.56	-.37	-.28	-.28	-.03	.21	-.33	-.48	-.34	-	-.27	-.49	-.44	-.23	-.59	-.52	-
1978	-.12	-.03	-.55	-.52	-.72	-.25	-.18	-.52	-.37	-.29	-.28	-.02	.20	-.33	-.47	-.34	-	-.27	-.48	-.42	-.23	-.54	-.49	-
1979	-.10	.00	-.54	-.52	-.67	-.23	-.17	-.48	-.36	-.30	-.25	.00	.20	-.30	-.45	-.33	-	-.26	-.46	-.39	-.23	-.52	-.48	-
1980	-.09	.04	-.54	-.52	-.68	-.21	-.16	-.45	-.33	-.30	-.23	.00	.20	-.29	-.45	-.31	-	-.25	-.44	-.37	-.24	-.52	-.46	-
1981	-.07	.07	-.54	-.51	-.65	-.19	-.15	-.44	-.30	-.30	-.20	.00	.20	-.30	-.45	-.30	-	-.25	-.43	-.36	-.26	-.48	-.43	-
1982	-.05	.07	-.54	-.50	-.55	-.19	-.15	-.43	-.29	-.29	-.18	.00	.20	-.31	-.45	-.31	-	-.26	-.43	-.36	-.26	-.48	-.43	-.38
1983	-.02	.08	-.54	-.48	-.58	-.21	-.15	-.41	-.29	-.30	-.16	.00	.19	-.29	-.44	-.32	-.78	-.25	-.42	-.36	-.25	-.50	-.45	-.39
1984	.03	.09	-.54	-.45	-.64	-.22	-.16	-.39	-.27	-.28	-.13	.00	.19	-.28	-.43	-.33	-.77	-.24	-.41	-.36	-.24	-.49	-.46	-.41
1985	.33	.10	-.54	-.42	-.64	-.22	-.16	-.37	-.25	-.26	-.11	.00	.19	-.26	-.41	-.32	-.76	-.23	-.39	-.33	-.23	-.43	-.47	-.42
1986	.04	.13	-.54	-.40	-.61	-.21	-.14	-.34	-.23	-.26	-.08	.01	.18	-.22	-.40	-.31	-.75	-.22	-.37	-.30	-.22	-.32	-.42	-.43
1987	.06	.16	-.54	-.38	-.52	-.20	-.13	-.30	-.21	-.24	-.05	.03	.18	-.19	-.39	-.28	-.75	-.22	-.34	-.28	-.21	-.27	-.36	-.43
1988	.08	.21	-.54	-.35	-.53	-.18	-.13	-.26	-.19	-.22	-.01	.05	.17	-.19	-.38	-.24	-.75	-.22	-.30	-.26	-.21	-.24	-.33	-.42
1989	.15	.25	-.53	-.32	-.61	-.16	-.12	-.22	-.16	-.20	.02	.05	.17	-.19	-.38	-.22	-.74	-.22	-.26	-.24	-.20	-.20	-.30	-.41
1990	.08	.28	-.52	-.29	-.65	-.14	-.12	-.20	-.15	-.19	.03	.06	.17	-.19	-.38	-.21	-.75	-.22	-.22	-.22	-.19	-.18	-	-.40
1991	.08	.33	-.52	-.29	-.61	-.13	-.11	-.19	-.13	-.19	.03	.06	.17	-.18	-.37	-.17	-.75	-.22	-.21	-.21	-.18	-.16	-	-.38
1992	.10	-	-.51	-.28	-.58	-.11	-.10	-.18	-.12	-.19	.04	.07	.16	-.18	-.35	-.11	-.74	-	-.22	-.19	-.17	-.16	-	-.37
1993	.12	-	-.50	-.27	-.59	-.09	-.09	-.15	-.12	-.19	.06	.07	.16	-.18	-.33	-.09	-.74	-	-.21	-	-.17	-.15	-	-.36
1994	-	-	-.49	-.27	-.56	-.07	-	-.14	-.11	-.20	.08	.08	.15	-.15	-.31	-.10	-.73	-	-.20	-	-.17	-.10	-	-
Mean	-.09	.05	-.56	-.52	-.75	-.27	-.19	-.40	-.32	-.33	-.21	.00	.20	-.30	-.50	-.33	-.75	-.28	-.46	-.39	-.24	-.41	-.52	-.40

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