

## Health Education and the Demand for Tobacco in Ireland, 1953-76: A Note

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THE publication of the report by the Royal College of Physicians in 1962 linking cigarette smoking and lung cancer led throughout the western world to mounting pressure to curb the smoking habit. In Ireland the cancer scare received widespread press coverage, television advertising was phased out by 1971, a warning is now printed on all cigarette packages, and there have been several publically-financed anti-smoking publicity campaigns. Figures for tobacco "retained for home use" *per capita* (see Table 1) show no long-run trend and might be interpreted as indicating the success of the various measures that have been taken to discourage smoking. More systematic evaluation is, however, required to net out the effect of health education measures. The only study that has addressed this issue is O'Riordan (1969), which was confined to the years before 1968 and found little evidence that consumption had fallen as a result of the cancer scares.

A number of problems arise in trying to assess the effects of health education measures on the demand for tobacco products. Only 24 annual observations are available on a consistent basis (see notes to Table 1), which allow relatively few degrees of freedom for trying to capture the effects of the rather large number of specific measures that have been taken since 1962 to discourage smoking. Work by Atkinson and Skegg (1973) with data for the United Kingdom has shown how sensitive the effect attributed to specific measures is to the manner in which they are included in the econometric model. It is clearly impossible to experiment with a large number of specifications of the effects of several specific health education measures using the available data base.

Table 1: *Data*

| <i>Year</i> | <i>Tobacco consumption<br/>per adult<br/>(lbs)</i> | <i>Real personal consumer<br/>expenditure per adult<br/>(£ 1970)</i> | <i>Real tobacco<br/>price index<br/>(1970 = 100)</i> |
|-------------|--|--|--|
| 1953        | 6.6  | 343  | 70.4   |
| 1954        | 6.5  | 349  | 70.4   |
| 1955        | 6.6  | 370  | 67.9   |
| 1956        | 6.2  | 363  | 75.4   |
| 1957        | 5.9  | 358  | 78.3   |
| 1958        | 5.8  | 377  | 79.0   |
| 1959        | 6.2  | 383  | 79.0   |
| 1960        | 6.3  | 404  | 80.6   |
| 1961        | 6.6  | 418  | 82.8   |
| 1962        | 6.4  | 430  | 85.1   |
| 1963        | 6.4  | 445  | 86.8   |
| 1964        | 6.5  | 462  | 89.0   |
| 1965        | 6.4  | 463  | 90.9   |
| 1966        | 6.1  | 471  | 97.5   |
| 1967        | 6.3  | 486  | 100.0  |
| 1968        | 6.1  | 525  | 98.8   |
| 1969        | 6.1  | 553  | 101.1  |
| 1970        | 5.9  | 563  | 100.0  |
| 1971        | 6.0  | 574  | 94.5   |
| 1972        | 6.1  | 601  | 86.6   |
| 1973        | 6.4  | 625  | 83.5   |
| 1974        | 6.7  | 631  | 74.0   |
| 1975        | 6.6  | 605  | 79.8   |
| 1976        | 6.7  | 610  | 76.1   |

*Notes:*

- (i) "per adult" = per head of estimated population aged over 14.
- (ii) The tobacco series used is the Revenue Commissioners figure for "tobacco retained for home use". In 1978 a new system of taxation was introduced and this series was replaced by two new series on the weight of manufactured tobacco retained for home use and the number of cigarettes produced. The change over to the new tax regime is believed to have reduced clearances in the year 1977, which has been omitted from the analysis for this reason.
- (iii) Before 1974 the tobacco data were published for the year ending in March, and it was necessary to take weighted averages of adjacent years to arrive at a calendar year figure.
- (iv) The consumer expenditure data are from *National Income and Expenditure*.
- (v) The real tobacco price is the consumer price index (all items) divided into the tobacco component of this index. Before 1968 the relevant price deflators of personal consumption expenditure from the national accounts were used.

For these reasons it was decided to limit the present note to the following issue: has the demand relationship for tobacco remained stable over the period 1953–76 or can significant breaks in the relationship be identified

and linked with periods of more active health education policy? This question was explored using the (Chow) F-test for the homogeneity of the period 1953–76. A linear regression equation relating *per capita* tobacco consumption, *per capita* real consumer expenditure, and the real tobacco price was estimated for the entire period 1953–76 and for the 17 pairs of sub-periods from 1953–56, 1957–76 to 1953–72, 1973–76. A trend variable was not included because the dependent variable was trendless.

The values of the F-test for each pair of sub-periods are shown in the upper half of Table 2. It may be seen that all but the first two and the last five are highly significant statistically. This allows the rejection of the hypothesis that the demand relationship was stable over the entire period. The F-value reaches a peak when the sample period is split into the two sub-periods, 1953–60 and 1961–76. However, high F-values are also recorded for a number of alternative choices of sub-periods with the dividing line in the early 1960s. It is important to note that a significant shift in the demand relationship occurred before the period of active health education ushered in by the 1962 report on smoking and lung cancer.

Table 2: *F-values for tests of stability of the demand relationship*

| <i>a. Period 1953–76.</i> |                |                    |                |
|---------------------------|----------------|--------------------|----------------|
| <i>Sub-periods</i>        | <i>F-value</i> | <i>Sub-periods</i> | <i>F-value</i> |
| 1953–56, 1957–76          | 0.5            | 1953–64, 1965–76   | 6.9*           |
| 1953–57, 1958–76          | 1.5            | 1953–65, 1966–76   | 7.2*           |
| 1953–58, 1959–76          | 6.5*           | 1953–66, 1967–76   | 8.2*           |
| 1953–59, 1960–76          | 9.2*           | 1953–67, 1968–76   | 7.3*           |
| 1953–60, 1961–76          | 10.4*          | 1953–68, 1969–76   | 3.5†           |
| 1953–61, 1962–76          | 5.5*           | 1953–69, 1970–76   | 3.1†           |
| 1953–62, 1963–76          | 6.3*           | 1953–70, 1971–76   | 1.1            |
| 1953–63, 1964–76          | 7.0*           | 1953–71, 1972–76   | 0.5            |
|                           |                | 1953–72, 1973–76   | 0.0            |
| <i>b. Period 1961–76.</i> |                |                    |                |
| <i>Sub-periods</i>        | <i>F-value</i> | <i>Sub-periods</i> | <i>F-value</i> |
| 1961–64, 1965–76          | 0.8            | 1961–69, 1970–76   | 2.2            |
| 1961–65, 1966–76          | 0.8            | 1961–70, 1971–76   | 1.9            |
| 1961–66, 1967–76          | 1.5            | 1961–71, 1972–76   | 1.9            |
| 1961–67, 1968–76          | 1.1            | 1961–72, 1973–76   | 2.1            |
| 1961–68, 1969–76          | 0.9            |                    |                |

\* = significant at the 0.01 level

† = significant at the 0.05 level.

The approach used to ascertain the best sub-division of the entire 24-year period may also be applied to the 16-year period 1961–76 to see whether further shifts in the demand relationship occurred as the health education programme intensified and specific measures, such as banning television advertising, were introduced. The lower half of Table 2 presents the F-values obtained by applying the Chow test to all possible sub-divisions of the period 1961–76. It may be seen that none of these values approaches significance at the 0.05 level, and hence the hypothesis that the period 1961–76 was homogeneous as far as the demand for tobacco products is concerned cannot be rejected.

Turning from the identification of the best grouping of the sample period into homogeneous sub-periods to the interpretation of the reasons for the observed shift in the demand relationship in the early 1960s, it is helpful to consider the estimated parameters of the two equations which minimise the residual variance for the entire sample:

|         | <i>Estimated elasticities at<br/>mean values of the variables</i> |                    | $\bar{R}^2$ | DW  |
|---------|---|--------------------|-------------|-----|
|         | <i>Price</i>  | <i>Expenditure</i> |             |     |
| 1953–60 | –0.79   | +0.33*             | 0.64        | 1.4 |
| 1961–76 | –0.38   | –0.09              | 0.74        | 1.6 |

\*Based on non-significant coefficient estimate.

It seems that after 1960 the demand for tobacco became much less responsive to prices and total expenditure than had been the case during the 1950s. One possible interpretation of this change in the demand for tobacco is that *per capita* consumption had reached a saturation level in Ireland by the late 1950s and with rising living standards cigarettes became an inferior good. This view is supported by the fact that Ireland's *per capita* level of smoking was among the highest in the world by 1960, and there is relatively little room for expanding the demand for tobacco by encouraging smokers to move to higher quality or more expensive products. Another possible interpretation of the change in demand is the impact of filter-tipped cigarettes in the late 1950s and the rapid growth of their share of the market. The stability of the demand curve over the period since 1960 is disappointing to those who seek to attribute the change in smoking patterns to the effects of health education. In particular, there is no evidence that the banning of television advertising in Ireland had a significant effect on demand.

The very low price elasticity and the *negative* expenditure elasticity estimated for the period 1961–76 is consistent with the pattern of smoking by socio-economic class that has emerged in the UK in recent years (CSO,

UK, 1978), which shows smoking to be increasingly concentrated among relatively heavy smokers in the lower socio-economic groups.

From a policy viewpoint it is curious to note that the real price of tobacco has declined steeply during the 1970s. This is, of course, due to failure of the tax element to keep pace with inflation. As may be seen from Table 1, the real price fell by 25 per cent between 1969 and 1976. The most recent consumer price index shows that from a level of 100 in November 1968, the real price of tobacco products had declined to 67 in May 1979. Using the price elasticity estimated for 1961–76 period, it may be calculated that if the real tobacco price had been maintained at its 1970 level, *per capita* consumption of tobacco would be about 12 per cent lower today than is actually the case. These findings suggest that higher tobacco prices are more effective than anti-smoking campaigns or curbs on advertising as a means of reducing consumption of tobacco.

#### REFERENCES

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