Price and Income Expectations in Belgium
Results of a 1974 Survey

by

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I. INTRODUCTION

In this paper we intend to analyse the results of a survey on income and price expectations conducted between November 1973 and April 1974. (1) The main aim of our research is to compare income and price expectations between different income and socio-economic groups. In the last section we will also report results on indexation. These results should be interpreted with some caution since some essential data (gross income and taxes) are missing.

One general result of the survey is quite obvious: people form income and price expectations. This is quite important for economic policy (e.g. the Phillips curve problem). We have to admit however that it would be difficult to claim that the sample is representative for the whole Belgian population. The respondents are indeed all members of a Belgian consumer organisation (about 200,000 members). We think however that an analysis of the survey may offer some new insights into some factors influencing expectations.

(1) Results of another survey conducted by Sobemap can be found in Sobemap [9].
2. A DESCRIPTION OF THE SURVEY

The data on price expectations were obtained as a by-product of a large survey on consumers' buying intentions. The survey questionnaire was supplemented to the monthly review of a Belgian consumer union (2) in the December 1973-January 1974 period. In March-April 1974 a note was published reminding the subscribers of the questionnaire. Important here is that the answers to the survey were obtained in the period of the oil crisis.

Besides the questions on buying intentions other information was asked related to family structure, education, net family income in 1973, main occupation, ...

The two important questions for our study were:

— How much, do you think, your net family income will increase in 1974? .......... %

— How much do you think prices will increase in 1974? .......... %

Different comments can be made on these questions. First, income expectations concern total net family income. This implies that if e.g. a child is leaving school, the expected increase in total family income will be very large; the inverse happens if a member of the family is expected to get married or to be laid off. Concerning expectations it should be observed that the enquiry asked for expected increases, not for expected changes. This can explain why all figures of price and income expectations are positive. A third made. It may be assumed that respondents base their answers on made. It may be assumed that respondents base their answers on some kind of probability distribution about possible price (income) changes. As we do not have any knowledge of the distribution used, it is impossible to find out if the reported figures relate to the average, the mode or some other statistic of the distribution. This problem is not a major one if we can assume that the distribution was a symmetrical one but this seems somewhat unrealistic, given the time period when the survey was conducted. We do however not believe that this affects the results significantly.

Another comment relates to the meaning of the price index. It can be assumed that the figures of expected price increases refer to a consumer price index. The relevant index will differ from the official index for several reasons: geographical location (the

(2) Test Aankoop - Test Achat.
official consumer price index is an average of geographical price levels), the consumer can base his estimation on a few «key» product price levels, the composition of the basket of goods used by the consumer will in general differ from the basket chosen by the authorities in the calculation of the official price index . . . (3)

The meaning of the reported expected increase is not clear either. Is this an end of year to end of year percentage change, an average over the year, a mid-year to mid-year percentage change?

The last comment relates to the reported net income. It is not clear, and we are not informed about this, if this income is simply taxable income as reported on the income tax forms minus income tax or if it includes other income which has not been reported to the authorities. This problem of fiscal fraud is very important for some socio-economic groups (especially groups 6, 7 and 8 in table 1). To give some information about the respondents we reproduce in table 1 relative frequencies on two main characteristics of the sample i.e. income and socio-economic group composition. We have made a distinction between respondents from Flanders and from Wallonia. (4) The total number of respondents, excluding those who have not answered the price expectation question is 2420 (1235 French and 1185 Flemish questionnaires have been returned).

As can be seen in the table there are relatively more respondents with a small or a large income in Flanders than in Wallonia. Concerning the socio-economic characteristic we can observe that relatively more respondents in Wallonia belong to the lower administrative staff. This is compensated by a smaller relative importance of the managerial group (including occupations like lawyers . . .).

(3) Results of a survey conducted at about the same time as the survey analyzed in this paper show that 6 out of 10 respondents thought that the price level increased by more than 7 per cent (the observed increase in 1973). Two thirds of the respondents think further that the official price index understates inflation (SOBEMAP p. 4, [9]).

(4) This point is analyzed in detail below.
TABLE 1

Relative frequencies of income and socio-economic groups
(All respondents)

<table>
<thead>
<tr>
<th>Income groups</th>
<th>Socio-economic groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group (a) Flanders</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>I) 0 - 99</td>
<td>1.07</td>
</tr>
<tr>
<td>II) 100 - 199</td>
<td>3.88</td>
</tr>
<tr>
<td>III) 200 - 299</td>
<td>18.68</td>
</tr>
<tr>
<td>IV) 300 - 399</td>
<td>27.03</td>
</tr>
<tr>
<td>V) 400 - 499</td>
<td>20.74</td>
</tr>
<tr>
<td>VI) 500 - 599</td>
<td>12.07</td>
</tr>
<tr>
<td>VII) 600 - 699</td>
<td>7.11</td>
</tr>
<tr>
<td>VIII) 700 - 799</td>
<td>4.05</td>
</tr>
<tr>
<td>IX) 800 -</td>
<td>5.37</td>
</tr>
</tbody>
</table>

(a) Occupation is used as group definition.

3. THE ANALYSIS

a) Defining the populations

Our first task is to test if the Flemish and French interviewees are samples of the same population. The easiest way to test this is by using a Chi-square statistic. The procedure involves accepting one population as a basis for reference (e.g. income distribution in Wallonia). The observed relative frequencies of this distribution are used, by multiplying them by the total number of observations of the other distribution, to calculate expected total frequencies for the other distribution. The following statistic can then be calculated:
\[ \chi_{k-1} = \sum_{j=1}^{k} \frac{(F_{oj} - F_{pj})^2}{F_{pj}} \]

where \( k \) : number of frequency groups (income groups in our example);

\( F_{pj} \) : predicted absolute frequency for group \( j \) (equal to total number of respondents in the Flanders multiplied by the relative frequency of group \( j \) in Wallonia);

\( F_{oj} \) : observed absolute frequency for group \( j \) (in Flanders in our example).

It is obvious that if the calculated Chi-square statistic is very large we would reject the hypothesis that both distributions are equal. One should observe that the test is not symmetric (this occurs because we divide by the predicted frequency) so that to test e.g. if the income distribution in Flanders is similar to that in Wallonia, we have to perform two tests i.e. take first the distribution in Flanders as reference and secondly take the distribution in Wallonia as reference. A priori a different result is possible.

The next table shows the results of the different tests. We report firstly the calculated Chi-square statistics when the relative distributions in Flanders are taken as reference and then the statistics when the relative distributions in Wallonia are taken as reference.

**TABLE 2**

Chi-square values for different characteristics of the population (a)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference distribution (b)</th>
<th>Degrees of freedom</th>
<th>Five percent confidence limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( F ) (c)</td>
<td>( W ) (c)</td>
<td></td>
</tr>
<tr>
<td>income groups ( (d) )</td>
<td>132.49</td>
<td>266.08</td>
<td>8</td>
</tr>
<tr>
<td>socio-economic groups ( (d) )</td>
<td>124.00</td>
<td>133.03</td>
<td>8</td>
</tr>
<tr>
<td>price expectations ( (e) )</td>
<td>6.89</td>
<td>14.38</td>
<td>11</td>
</tr>
<tr>
<td>income expectations ( (e) )</td>
<td>26.04</td>
<td>14.92</td>
<td>11</td>
</tr>
</tbody>
</table>

(a) All data have been used.
(b) The reference distribution is indicated so that automatically we know the other distribution.
(c) \( F \) : Flanders; \( W \) : Wallonia.
(d) The different groups are listed in table 1.
(e) The following classes have been used (we report only the median in percentage) : 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31 and other.
That the two samples are part of the same population has to be rejected in five out of eight cases. Only price expectations seem to form one common national group. This might indicate that price expectations are partly based on current and recent inflation rates which are perceived by the respondents through the widely announced evolution of the consumer price level.

It should be noted that these results are based on tests where only one variable at a time is taken into account. A generalization is possible but since we will never use all variables at the same time, it does not seem necessary to perform this test. As a working hypothesis it seems better to analyse the survey as if the samples for Flanders and Wallonia are not part of the same population. This hypothesis can only make our results more interesting. Even if this hypothesis is wrong (which would be surprising given the results of the previous table) this would not introduce errors in the tests we report below.

b) Further tests

i) Introduction

In this section we will report results obtained by testing the survey in different ways. We have chosen to use the analysis of variance as instrument of analysis. The main objective will be to find out if expectations on income and prices are related to the income level and the socio-economic group to which the respondent belongs.

The different income and socio-economic groups retained are listed in table 1. The income and price expectations are divided into groups as mentioned in note (e) of table 2.

The tables reporting the results are standard tables for the analysis of variance.

ii) Price expectations

As the observed inflation rate increased over the past years, economists have attached more and more importance to the influence of expected inflation. It is now a well stated fact, accepted without much discussion, that expected inflation influences wage changes and interest rates. The discussion centers only on the magnitude of the effect, not on its existence. The size of the price expectation coefficient however is crucial for economic policy.

A more technical discussion concerns the specification of price expectations. Econometricians generally use a distributed lag over
past inflation. This is certainly not an ideal procedure but if no expected price change series are available, it is one of the best available alternatives.

An expected price changes series however can be generated in three ways. First, and this is not really a solution to the problem, one could estimate e.g. an interest rate equation and obtain empirical values for the distributed lag coefficients of the price change variables. Imposing the constraint that the sum of these coefficients must be equal to one, one could calculate an expected inflation series and use this in e.g. a wage equation.

The other solutions are based on survey data. The most interesting one is the survey conducted by Livingston who asks managers every six months (since 1946) what price level will be observed in six and twelve months. This series has been used by different authors (e.g. Gibson [2], Pyle [8], Turnovsky-Wachter [11], ... ) in studies on wage changes and interest rates. The problem with these expectations is that they are not rational (see Pesando [7]). The reason is that the expected inflation rate over the next 12 months systematically underestimates the observed inflation rate over this period.

A third approach has been developed by Carlson and Parkin [1]. (5) These authors derive a price expectations series from qualitative survey data. These data are obtained as answers to questions like «Do you expect prices to increase, decrease or stay the same?». In this way Carlson and Parkin obtain a monthly series for expected inflation in the United Kingdom (1961-1973). (6)

The interesting feature of a series of expected price changes is that the validity of the distributed lag approach can be tested. The results (see Turnovsky [10], Knöbl [5], Carlson and Parkin [1]) do indicate that price expectations are influenced by recent inflation rates. The expectation scheme however becomes more complicated as the rate of inflation increases. This is not surprising since the pay-off of better forecasts becomes larger. All authors, except Turnovsky [10], find that other variables besides past inflation (deviation from the average capacity utilization rate (Knöbl [5]), exchange rate (Carlson-Parkin [1]) influence expected inflation.

(5) Knöbl [5] has developed a nearly identical approach.
(6) The series has been used by Parkin [6] a.o. in their study on the effects of wage-price controls on wage inflation.
As a general information we report in the next table regionally observed inflation rates for 1973 and 1974 and the mean expected rates for 1974.

<table>
<thead>
<tr>
<th>TABLE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regionally (a) and nationally expected and observed inflation rates (percentages) (b)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Flanders</th>
<th>Wallonia</th>
<th>National average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed inflation</td>
<td>1973</td>
<td>1974</td>
<td>1973</td>
</tr>
<tr>
<td></td>
<td>7.33</td>
<td>15.52</td>
<td>7.40</td>
</tr>
<tr>
<td>Expected inflation for 1974</td>
<td>11.29</td>
<td>11.38</td>
<td>11.33</td>
</tr>
</tbody>
</table>

(a) Unweighted average of inflation rates in the different provinces (own calculations based on official figures).
(b) End of year to end of year percentage changes.

Note that the previous table allows us to make some general comments about the accuracy of the expected inflation rates. On average the prediction error is about 4.3 percent. This appears to be quite large but note that the observed inflation rates more than doubled between 1973 and 1974.

The inflation rate for 1974 was predicted relatively well in spite of the unprecedentded acceleration in this rate (1). Observe that this may be due to some factors inherent in the survey:
- the survey was conducted a few months after the oil crisis. Some information about the effects of the crisis was already available.
- the survey was conducted during the first quarter of 1974 so that already some information about the evolution of prices in 1974 was available. In fact, the instantaneous inflation rate amounted to nearly 14 percent (annual rate) in the first quarter of 1974.

The two tests on price expectations that we have performed here relate to the question if price expectations are influenced by the

(1) A « naive » look at the speed of adjustment reveals that this figure equals here about 0.5, this of course under the assumption that the officially recorded price increases were perceived correctly in 1973 (see a previous note on this point).
net income level of the family to which the respondent belongs or by his socio-economic status.

The next table presents the results for the first test i.e. between family income levels and price expectations. As observed we make a distinction between the respondents from Flanders and from Wallonia. One should however observe that we have excluded those price expectations exceeding 26 per cent. The reason is that it is difficult to think of these as being based on some kind of logic. The results however are not much affected by this restriction on our data.

Table 4, column (1) shows clearly that we cannot reject the hypothesis that families with different income levels do not expect different inflation rates. So there is no indication that different net family income levels generate different price expectations. We do not think that the definition of the income variable can explain this fact. One should note that the F-value for Flanders is about twice the value obtained for Wallonia, indicating that a rather weak relationship between income levels and price expectations could exist in Flanders.

A related test can be performed by using the socio-economic group as criterion variable. It is of course true that the socio-economic group is a good proxy for income levels. Given however that in the survey the income variable is defined as net family income, the proxy is certainly not perfect. This is also clear when we compare the results reported in columns 3 and 4 with those of columns 1 and 2.

The null hypothesis that different socio-economic groups do not expect different inflation rates is accepted for Wallonia and rejected for Flanders (table 4, column (2)).

iii) Income expectations

In this section we will first perform the same tests as in the previous section. Later we will analyse the results of the survey concerning indexation.

Table 4, column (3) reports the results when a test is made about the influence of income levels on income expectations. As can be seen the null hypothesis of no relationship has to be rejected.

The same conclusion is reached when the relationship income expectations-socio-economic groups is analyzed (see table 4, column (4)).
TABLE 4
Analysis of variance (a)(b).

<table>
<thead>
<tr>
<th></th>
<th>Price expectations-net family income levels (1)</th>
<th>Price expectations-socio-economic group (2)</th>
<th>Income expectations-net family income levels (3)</th>
<th>Income expectations-socio-economic group (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of squares</td>
<td>Sum of squares</td>
<td>Sum of squares</td>
<td>Sum of squares</td>
</tr>
<tr>
<td>FLANDERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between groups</td>
<td>220.97</td>
<td>408.19</td>
<td>6147.13</td>
<td>3013.06</td>
</tr>
<tr>
<td>Within groups</td>
<td>23959.17</td>
<td>23771.94</td>
<td>112,000.00</td>
<td>115,000.00</td>
</tr>
<tr>
<td>Total</td>
<td>24180.14</td>
<td>24180.13</td>
<td>118,147.13</td>
<td>118,013.06</td>
</tr>
<tr>
<td></td>
<td>( F = 1.3558 )</td>
<td>( F = 2.5242 )</td>
<td>( F = 8.2396 )</td>
<td>( F = 3.9235 )</td>
</tr>
<tr>
<td>WALLONIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between groups</td>
<td>111.56</td>
<td>139.44</td>
<td>2448.64</td>
<td>3485.82</td>
</tr>
<tr>
<td>Within groups</td>
<td>23818.52</td>
<td>23790.64</td>
<td>95824.89</td>
<td>94702.56</td>
</tr>
<tr>
<td>Total</td>
<td>23930.08</td>
<td>23930.08</td>
<td>98273.53</td>
<td>98188.39</td>
</tr>
<tr>
<td></td>
<td>( F = 0.7178 )</td>
<td>( F = 0.8982 )</td>
<td>( F = 4.0214 )</td>
<td>( F = 5.7697 )</td>
</tr>
</tbody>
</table>

(a) Price expectations larger than 26 per cent excluded; all income levels included.
(b) The degrees of freedom are for price expectations (8:1,176 and 8:1,184) and for income expectations (8:1,201 and 8:1,209).
The conclusion from table 4, columns (3) and (4) is clear: different income and socio-economic categories have different income expectations. The average income expectations in Flanders and in Wallonia for the different income and socio-economic groups are reproduced in table 5. The average income expectations for Belgium is 9.0 per cent.

**TABLE 5**

Average income expectations in Flanders and in Wallonia for different income and socio-economic groups

(*in percentages*)

<table>
<thead>
<tr>
<th>Income group (a)</th>
<th>Socio-economic group (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flanders</td>
</tr>
<tr>
<td>I</td>
<td>8.4</td>
</tr>
<tr>
<td>II</td>
<td>9.6</td>
</tr>
<tr>
<td>III</td>
<td>8.9</td>
</tr>
<tr>
<td>IV</td>
<td>8.5</td>
</tr>
<tr>
<td>V</td>
<td>9.2</td>
</tr>
<tr>
<td>VI</td>
<td>8.9</td>
</tr>
<tr>
<td>VII</td>
<td>8.9</td>
</tr>
<tr>
<td>VIII</td>
<td>8.7</td>
</tr>
<tr>
<td>IX</td>
<td>8.7</td>
</tr>
<tr>
<td>Total</td>
<td>8.9</td>
</tr>
</tbody>
</table>

(a) Income groups are listed in table 1.
(b) Socio-economic groups are listed in table 1.

The fact that we do not observe the same income expectations for all groups may be due to the definition of income retained in the survey: net family income after tax. The progressivity of tax scales will indeed imply that, for a given increase of income, the higher the income, the lower the rise of net income after tax. That the previous results may be due to the use of a net income definition and to the progressivity of the income tax scales is shown in appendix A.

To study the effects of income taxes we will perform a regression analysis. The basic equation is derived in the following way.
We start from the following definition (an superscript e indicates that the variable is an expected one):

\[ yN^e = y^e - T^e \]

where

\( y \): gross income
\( T \): total income taxes paid
\( yN \): net income.

We neglect in what follows that the income concept relates to the family. (\(^8\)) So we can write:

\[ \frac{\Delta yN^e}{yN^e} = \frac{\Delta y^e}{yN^e} - \frac{\Delta T^e}{yN^e} \]

\[ \dot{y}N^e = \dot{y}^e - \frac{T^e}{yN^e} \]

\[ = \dot{y}^e + (\dot{y}^e - T^e) \frac{T^e}{yN^e} \]  \( (I) \)

The ratios \((y^e/yN^e)\) and \((T^e/yN^e)\) give an indication of the average tax rate. The problem however is that we do not have data on \(\dot{y}^e\), \(y^e\) and on income taxes.

We may specify the expected rate of growth in gross income as:

\[ \dot{y}^e = \alpha + \dot{p}^e \]

where \(\dot{p}^e\): expected inflation rate

or, if we do not believe in a complete indexation, as:

\[ \dot{y}^e = \alpha + \gamma \dot{p}^e \quad \gamma < 1 \]

The specification of \(T\) and \(T\) is more difficult. One should observe that we do not need to find an empirical counterpart to

\(^8\) In our empirical analysis we have therefore excluded income expectations exceeding 35 percent.
the existing income tax system. We have to try to specify how the consumers think the system works.

We have tested three different tax equations. The first tax function is:

\[ T^e = ty^e \]

so that:

\[ T^e = \dot{y}^e \]

Expression (I) can now be written as (\(^a\)):

\[
\dot{T}^e = \dot{y}^e = \alpha + \gamma \dot{p}^e
\] (II)

This equation has been estimated for Flanders and Wallonia, using all data and for the different income and socio-economic groups. The results are:

Flanders:

\[ \dot{y}N^e = 6.218 + 0.233 \dot{p}^e \]

(16.05) (7.33)

\[ R^2 = 0.044 \] (1)

Wallonia:

\[ \dot{y}N^e = 6.086 + 0.266 \dot{p}^e \]

(15.50) (8.25)

\[ R^2 = 0.053 \] (2)

(values below coefficients are t-statistics).

The results for income and socio-economic groups are reported in table 9.

The results concerning income groups seem to indicate that a higher income implies a smaller coefficient of expected inflation. The decline in this coefficient, as income grows, is compensated by an increase in the value of the intercept.

Different reasons to explain these results may be advanced:

— the Katona-effect (see Katona [3], [4]) may play i.e. as people earn a higher income they consider this as the result of personal efforts, not indexation.

\(^{(*)}\) As it is clear from the appendix we would obtain the same function, irrespective of the tax function, if people simply think that this year's tax rate will equal last year's.
This would be reflected in a high value of the intercept (capturing i.e. the personal effort effect or the promotion effect).
— the tax scales considered by the respondents are not the ones used in deriving the estimated equation.

The results concerning socio-economic groups are less clear. The coefficient of the price expectation variable is always well below unity. This may again be explained in the same way as we have done for the income group results. One should observe here however that nearly all price expectations coefficients are significantly different from zero.

A second specification we have tried for the tax function is:

\[ T^e = \eta + ty^e \]

so that:

\[ \dot{T}^e = ty^e \frac{y^e}{T^e} \]

Expression (I) can now be written as:

\[ \dot{y}N^e = \dot{y}^e + (\dot{y}^e - ty^e) \frac{y^e}{T^e} \frac{T^e}{yN^e} \]

\[ = \dot{y}^e + \frac{\dot{y}^e}{yN^e} - \dot{y}^e \frac{y^e}{yN^e} \]

\[ = \dot{y}^e + \frac{\dot{y}^e}{yN^e} (T^e - ty^e) \]

Since:

\[ T^e = \eta + ty^e \]
\[ T^e - ty^e = \eta \]

so that:

\[ \dot{y}N^e = \dot{y}^e + \frac{\dot{y}^e}{yN^e} \cdot \eta \]

The estimated equation has been \((yN^e)\) is replaced by \(yN\):

\[ \dot{y}N^e = \alpha + \gamma \dot{p}^e + \frac{\alpha}{yN} \cdot \eta + \eta \gamma \frac{\dot{p}^e}{yN} \]  \hspace{1cm} (III)

One should observe that the coefficient \(\eta\) is over-determined.
<table>
<thead>
<tr>
<th>Income groups (a)</th>
<th>Flanders</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Price expectations</td>
<td>R²</td>
<td>Number of observations</td>
<td>Constant</td>
<td>Price expectations</td>
<td>R²</td>
<td>Number of observations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>-0.636</td>
<td>0.900*</td>
<td>0.469</td>
<td>11</td>
<td>0.865</td>
<td>0.718*</td>
<td>0.532</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>8.079*</td>
<td>0.133</td>
<td>0.012</td>
<td>41</td>
<td>3.453*</td>
<td>0.414*</td>
<td>0.169</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>5.957</td>
<td>0.247*</td>
<td>0.055</td>
<td>216</td>
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<tr>
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(a) Income groups are listed in table 1.
(b) Socio-economic groups are listed in table 1.
(*) Indicates a significant coefficient at the five percent level.
The regressions using all the data are \(^{(10)}\):

**Flanders:**
\[
\hat{y}N^e = 6.178 + 0.243 \hat{p}^e + 0.968 \left(\frac{1}{yN}\right) - 0.311 \left(\frac{\hat{p}^e}{yN}\right)
\]
\[
(9.71) \quad (4.18) \quad (0.06) \quad (0.20)
\]

\[
R^2 = 0.044 \quad (3)
\]

**Wallonia:**
\[
\hat{y}N^e = 7.168 + 0.207 \hat{p}^e - 37.814 \left(\frac{1}{yN}\right) + 1.848 \left(\frac{\hat{p}^e}{yN}\right)
\]
\[
(8.80) \quad (2.69) \quad (1.65) \quad (0.84)
\]

\[
R^2 = 0.057 \quad (4)
\]

The results indicate that the intercepts and the price expectations coefficients in regressions (3) and (4) are not significantly different from those of equations (1) and (2). The coefficients of the income variables are generally not statistically significant except one. Furthermore, they do not always have the exact sign (negative since \(\eta \leq 0\)).

Concerning the results on income groups (not reported here) we can no longer conclude, except for Flanders, that the magnitude of the price expectations coefficient declines as income grows. For Wallonia we can indeed argue that the inverse is true. For the socio-economic groups the results do not show a clear pattern.

A third and last specification for the tax function was:

\[
T^e = A(y^e)^\beta
\]

so that

\[
T^e = \beta \hat{y}^e
\]

Equation (I) can now written as:

\[
\hat{y}N^e = \hat{y}^e + (\hat{y}^e - \beta \hat{y}^e) \frac{T^e}{yN^e}
\]

\[
= \hat{y}^e + (1 - \beta) \frac{T^e}{yN^e}
\]

\(^{(10)}\) Income is measured in 10,000 Belgian francs.
One problem that remains here is the specification of \((T^e/yN^e)\).
We have assumed that:

\[ T^e/yN^e = X_0 + X_1 yN^e + X_2 (yN^e)^2 \quad X_1, X_2 > 0 \]

which seems to be realistic in view of our tax function.

We can now write that:

\[ yN^e = \alpha_1 + \alpha_2 \hat{p}^e + \alpha_3 yN^e + \alpha_4 (\hat{p}^e yN^e) + \alpha_5 (yN^e)^2 + \alpha_6 \hat{p}^e (yN^e)^2 \]

where:

\[ \alpha_1 = \alpha (1 + (1 - \beta) X_0) \]

\[ \alpha_2 = \gamma (1 + (1 - \beta) X_0) \]

\[ \alpha_3 = \alpha (1 - \beta) X_1 \]

\[ \alpha_4 = \gamma (1 - \beta) X_1 \]

\[ \alpha_5 = \alpha (1 - \beta) X_2 \]

\[ \alpha_6 = \gamma (1 - \beta) X_2 \]

Observe that it is not possible to identify the different structural coefficients from the estimated parameters. On the realistic assumption that \(X_0 = 0\) we are able however to find values for \(\alpha\) and \(\gamma\) since \(\alpha_1 = \alpha\) and \(\alpha_2 = \gamma\).

The estimated equations for Flanders and Wallonia are \((yN^e\) is replaced by \(yN)):

**Flanders**:

\[
\hat{y}N^e = 6.051 + 0.248 \hat{p}^e + 0.022 yN - 0.002 (\hat{p}^e yN) \\
(3.42) \quad (1.58) \quad (0.30) \quad (— 0.33) \\
— 0.000 (yN)^2 + 0.000 \hat{p}^e (yN)^2 \quad R^2 = 0.045 \\
(— 0.58) \quad (0.63)
\]

**Wallonia**:

\[
\hat{y}N^e = 2.856 + 0.470 \hat{p}^e + 0.130 yN — 0.008 (\hat{p}^e yN) \\
(1.75) \quad (3.50) \quad (1.95) \quad (— 1.55) \\
— 0.001 (yN)^2 + 0.000 \hat{p}^e (yN)^2 \quad R^2 = 0.057 \\
(— 1.62) \quad (1.33)
\]

The results for Flanders indicate that the intercept and the price expectation coefficient are comparable to those obtained in
equations (1) and (3). For Wallonia however the intercept is now much smaller and the expectation coefficient larger. This seems to indicate that $X_0$ is about zero in Flanders but not so in Wallonia. This again shows some dissimilarities between Flanders and Wallonia.

In the results concerning income and socio-economic groups (not reported) it is again difficult to find a clear pattern except that the implied price expectation coefficients of the regressions for the socio-economic groups in Flanders correspond rather well with the results of equation (5). This is also, although in a somewhat less extent, the case for Wallonia. As in equation III the regressions perform better for the lower income groups than for the higher income groups. This may indicate that the different tax functions we have tested do not match the tax function the consumers have in mind. Further work will however be difficult unless we can find a good proxy for gross income.

4. CONCLUSIONS

In this paper we have reported some tests of income and price expectations data obtained in a survey conducted in 1974. The results should be interpreted with some caution since the answers were obtained in the period of the oil crisis. Furthermore these results cannot be generalized since we cannot claim that our sample is representative for the whole Belgian population. Some results however are worthwhile:

— People do indeed form income and price expectations.
— These expectations are quite correct.
— In general, people with different income levels or belonging to different socio-economic groups, do not form different price expectations.
— Income expectations are related to the income group or socio-economic group to which the respondent belongs.
— The regression results nearly always show that income will mostly grow for other reasons than for inflation.

The last two conclusions indicate that people use a very complicated tax scale function (simple functions have been tested and have not raised the coefficient of the price expectation variable) (except for Wallonia (regression 6)) or that people think that the income tax system is more progressive than it is in reality. The better results obtained for Wallonia (regression 6) seem to indicate that the first explanation could be the correct one. Further tests however are impossible since we lack the required data. An easier explanation of course is the Katona-effect.
Appendix A:

INCOME DEFINITION AND THE PROGRESSIVITY OF INCOME TAXES

Defining: \( yN^e \): expected after tax income  
\( y^e \): expected gross income  
\( t \): tax rate.

A dot above a variable means that the rate of change of this variable is considered and the time period is indicated, if relevant, as a subscript. We assume also that all gross incomes are expected to grow at the same rate \( g \).

After tax income growth will be equal to:

\[
yN^e = \left[ \frac{y^e (1 - t_1)}{y_{e-1} (1 - t)} - 1 \right]
\]

where \( t \): average tax rate of the preceding year  
\( t_1 \): expected average tax rate for the current year.

This expression can also be written as:

\[
yN^e = \left[ \frac{y^e}{y_{e-1}} \frac{1 - t_1}{1 - t} - 1 \right]
\]

\[
= \left[ \frac{(g + 1) \frac{1 - t_1}{1 - t} - 1}{(1 - t_1) + \frac{1 - t}{t - t_1}} \right]
\]

If tax rates are progressive \( t_1 > t \), \( (1 - t_1) < (1 - t) \) and \( (t - t_1) < 0 \) so that \( yN^e \) will be less than \( g \). The higher the level of income, the higher \( t_1 \) relative to \( t \) and so the larger the difference \( yN^e - g \). If the tax rate of the preceding year and the expected one are equal we find that \( yN^e = g \). So if people calculate their expected net income by simply using the average tax rate of last year we can conclude that gross and net income will grow at the same rate.
REFERENCES