Measuring market power in French food manufacturing: a preliminary analysis

Catherine C. Benjamin, Chantal Le Mouël, Yves Surry

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C. Benjamin, C. Le Mouël, Y. Surry
INRA-ESR, Rennes

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Preliminary draft. This paper presents results of ongoing research. All errors remain ours. Comments are welcome.

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1. Introduction and background

Studying and analysing the role and structure of the French food processing industries can be justified on several grounds. First, food processing is an important industry for the whole French economy. Although it is a small contributor to France's GDP, value added and employment (4.7%, 2.9% and 2.5% respectively in 1994[1]), the food processing sector contributes significantly to the trade performance of the French economy. Thus, the value of food processing net exports totalled 27.4 billion Francs in 1994, accounting for about 27% of France's balance of trade.

In addition, among all manufacturing industries, food processing ranks nonetheless at the top. In fact, using the "NAP 40" level of French National Accounts nomenclature[2] and 1994 data, the food processing sector (excluding meat and dairy processing) is the second largest French manufacturing industry (after land transport equipment) in terms of output value (with 368.1 billion Francs accounting for 8.2% of all manufacturing output value) and the first one in terms of value added (with 149 billion Francs accounting for 8.3% of all manufacturing value added). The meat and dairy processing sector which rather generates low value added ranks only sixth, according to this indicator, among all French manufacturing industries (with 49.7 billion Francs accounting for 2.8% of total manufacturing value added). Nevertheless meat and milk processing remains the fourth largest French manufacturing industry in terms of production value (with 263.5 billion Francs which represents about 6% of total manufacturing output value).

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1 All data related to the size of the French food processing industry relative either to the whole domestic economy or to all manufacturing industries are issued from INSEE (1995).

2 NAP stands for "Nomenclature des Activités et des Produits". At the "NAP 40" level, two food processing industries are defined. The first one gathers all meat and dairy processing firms, while the second one refers to the remaining food processing industries.

Second, there is a strong interdependence between food processing and agricultural production. On the one hand, food processing industries constitute a major market for the domestic farm sector (according to the input-output table for 1994, about 50 % of the French farm sector output sales were directed to the domestic food processing industry). On the other hand, agricultural products account for a large share of total intermediate inputs used by the French food manufacturing industry (in 1994 farm inputs accounted for about 46% of the intermediate consumption expenditures of the domestic food processing industry).

As agricultural production and food processing are the most important activities in many rural areas in France, both activities are crucial as regards to rural development in France. In addition, the interdependence between the domestic farm sector and food processing industries is a key issue for agricultural policy analysis since it suggests that the effects of any changes in agricultural policy largely spread throughout the food processing sector. Therefore, the total effect of such policy changes on consumers, as well as on overall domestic welfare, depends to a large extent on the induced response of food processing industries in close relation with its indirect consequences through inter-industry transactions, on factor demand, income and trade.

Third, unlike the atomistic structure of the farm sector, food processing industries are somewhat concentrated and characterised by a small number of operating firms. Regarding France, empirical evidence shows that a lot of food processing industries are highly concentrated. Using the 4-firm concentration ratios reported by Galliano (1995) at the "NAP 600"[3] level and for the year 1987, it can be noted that, among the 38 food processing sectors recorded, the four largest firms account for more than 80 % of the total sectoral output in 11 sectors and for more than 50 % in 26 sectors. Thus, such market structure configurations, characterised by a few firms having large market shares, do not fit the assumptions of the perfectly competitive model. Under such conditions, one may reasonably assume the presence of (some) market power within the French food processing industries.

The above remarks clearly highlight the key role of French food processing industries as regards to the impact of agricultural policy measures on both the domestic farm sector and the whole national economy. This suggests that analysing and assessing agricultural policy issues for France in order to help policy makers in their future positions and decisions with respect to the Common Agricultural Policy requires to study the behaviour of domestic food processing industries, as essential economic actors in the repercussion of any policy changes between the domestic farm sector on the one hand and the rest of the French economy on the other hand.

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[3] The "NAP 600" level of the French National Accounts nomenclature distinguished about 700 products and is comparable to the US 6 SITC system. For the food manufacturing sector, the "NAP 600" level defines 42 food processing industries.

The current discussions on the future of the CAP increasingly call for such an analysis. Following the 1992 CAP reform which can be viewed as a first step in re-orienting the support provided to agriculture from market price support to direct income support, the question of decoupling direct payments from production decisions is at the core of the debate. Implementing more decoupled forms of assistance to farmers would imply a deep reinstrumentation of the current CAP, resulting in substantial price cuts on the main EU and French agricultural markets. The extent to what these price decreases would be transmitted from farm to wholesale/retail levels crucially depends on the pricing behaviour of French food manufacturers. Consequently, the market and welfare effects of such a CAP adjustment directly relates to the price-setting behaviour of domestic food processing firms. More generally, it is widely known that when the largest firms actually exert their market power on the input or output sides or both, the farm-wholesale/retail price spread is affected as the mark-up pricing rule within the concerned food industry changes. Therefore, the oligopolistic behaviour of food processing firms is likely to affect the market and welfare effects of farm price policy reforms (e.g. Peterson, 1989).

There is and has been a lot of studies analysing the French food processing sector. Most of them are descriptive and qualitative in nature. Some do look at the main characteristics of the food processing industries (e.g. Audroing, 1995) while others analyse their (non)competitive structure (e.g. Galliano, 1995) and their economic performances (annual reports on French food processing industries conducted by INSEE for instance). According to our knowledge, and apart the work conducted by Lavergne *et al.* (1996), the pricing behaviour of French food manufacturing firms has been a research topic ignored by economists. This state of affairs seems to be valid for the EU as a whole. In the same vein, the majority of existing studies, originated in the EU and aimed at evaluating various CAP reform scenarios, does not consider explicitly the food processing stage. Moreover, it is usually hypothesised that price changes at the farm level are fully transmitted to the wholesale and/or retail levels. In other words, such analysis implicitly assume that food processing industries play no role in the farm-wholesale/retail price spread, i.e. food processing firms behave as perfect competitors on both their input and output markets.

Despite the paucity of studies in Europe, the role and consequences of imperfect competition in domestic food processing industries have long been studied in North America (see Parker and Connor, 1979, Connor et Peterson, 1995, and Martimort and Moreaux, 1994, for a review). These existing studies deal with two main themes. The first one focuses on the identification and measurement of welfare losses due to market power in food manufacturing (e.g., Gisser, 1982 ; Chen and Lent, 1992 ; Maier, 1993 and Connor and Peterson, 1995). We should however note the only applications made in Europe by Martila (1996) and Lavergne *et al.* (1996) who have respectively undertaken to measure welfare losses resulting from market power in Finnish and French food manufacturing industries.

A common feature of these studies is that they must make an assumption about the form of competition occurring on the considered markets (i.e. about oligopolistic behaviours across food processing firms) which can vary from tight competition to collusive practices. In this regard, the other research theme developed in the empirical Industrial Organisation literature focusing on food manufacturing is concerned with the identification and the measurement of market power effectively exerted by food processing firms, that is to characterise the degree of competition across firms. Most of these studies use the conjectural variations modelling approach which is based on the idea that oligopolistic firms make their strategic decisions depending upon assumptions (i.e. conjectures) about the reactions of their rivals. Such an approach allows to define a common framework which covers many various oligopoly and/or oligopsony models (from perfect competition to monopoly/monospony), according to the value of the conjectural elasticities. The main advantage of this approach is that the conjectural elasticities can be estimated econometrically for various food processing industries, with the empirical results giving some insight on the degree of (im)perfect competition characterising these industries.

The basic conjectural model developed more than fifteen years ago by Applebaum (1982) and Gollop and Roberts (1979) considers only the case of a single output industry characterised by an oligopolistic structure in the output market. This model has been adapted and extended by many agricultural economists to capture specific features of the food processing sector, including: i) the multiple-output orientation of this industry (Shroeter and Azzam, 1990 ; Wann and Sexton, 1992) ; ii) the spatial nature of the production and input supplying process (Sexton, 1990) ; iii) the possibility that food processing firms could exert power simultaneously on several input and output markets (Shroeter, 1988 ; Azzam and Pagoulatos, 1990) ; iv) the existence of policy regulations in the upstream farm sectors (Rude, 1992 ; Oxley, 1994) ; v) the role of advertising (Roberts and Samuelson, 1988 ; Peterson, 1989) and vi) the role of dynamics (Oxley, 1994). Indeed, there is not a unique encompassing model framework able to capture all these various features of food processing industries but rather a wide range of specific conjectural variation model specifications which generally take into account one or two aspects of this sector.

Moreover, the empirical implementation of conjectural variation models applied to food processing industries rests on the use of duality theory of the firm and its various concepts. Hence, the firm's objective function as well as functional forms selected vary greatly among existing work. The food processing industries are modelled either through the primal approach based on the notion of production function or through the concepts of cost or profit functions. Each of these modelling approaches have their strengths and weaknesses. Thus, their selection for modelling a specific food manufacturing industry is done on case by case study and depends largely upon data availability and requirements.

The purpose of this study is to provide a preliminary quantitative assessment of market power in the French food manufacturing sector. A static conjectural variation model is used, based on the specification of a single output production function and assuming that food processing firms exert market power in the final output market. Because of data limitations and problems, this model is estimated for six French food processing industries. The rest of the paper is organised as follows. Section 2 develops the theoretical model. In section 3 the empirical implementation of the conceptual model is outlined. Section 4 discusses the data used and the empirical results. Finally, section 5 concludes.

2. Theoretical framework

We consider an industry where n firms produce a homogeneous output using three inputs : intermediate input x_{CI} , labour x_L and capital x_K. For ease of exposition, let's assume that all firms have similar technology, defined by the production function *f* such as :

$$y_j = f(x_{CIj}, x_{Lj}, x_{Kj}) \qquad \text{for } j = 1,\dots,n \qquad [1]$$

where y_j is the output of the *j*th firm.

Furthermore, we assume that each firm *j* exercises some market power in selling its output y_j but is a price-taker in the market for inputs. Although the latter assumption might be seen as rather restrictive at first glance, especially as regards to farm input markets which are often characterised by numerous farm sellers facing few food processing firms, it is adopted here as a first step to facilitate the empirical analysis. As it is discussed below, applying the conjectural variation approach to measure market power in French food manufacturing is compounded with data problems. A major problem lies in the lack of available data relative to both the value and the quantity of farm inputs used by each food processing industry. Statistical information on farm input uses by French food processing industries actually exists but is scattered through various data references. At this stage, a first exploratory investigation has been conducted but more work is needed for generating consistent data series on farm input value and volume used by each French food processing industry.

Let the inverse total market demand curve facing the industry for its output be given by :

$$P = g(Y) \qquad [2]$$

where P is the output market price and $Y = \sum_j y_j$ the total industry output.

Each firm j maximises its profit subject to the technological constraint and given the total demand on the output market. Hence, the firm j's profit maximisation problem is formulated as follows :

$$\max_{x_{mj}, y_j} [Py_j - \sum_m w_m x_{mj}] \qquad \text{for } m = CI, L, K \text{ and } j = 1,...,n \qquad [3]$$

subject to [1] and [2] and where w_m is the market price of input m, taken as exogenous by all firms j.

The first-order conditions corresponding to this profit maximisation problem are given by the following relations :

$$\frac{\partial P}{\partial Y}\frac{\partial Y}{\partial y_j}\frac{\partial y_j}{\partial x_{mj}} + P\frac{\partial y_j}{\partial x_{mj}} - w_m = 0 \qquad \text{for } m = CI, L, K \text{ and } j = 1,...,n \qquad [4]$$

which may be rewritten as :

$$P\frac{\partial y_j}{\partial x_{mj}}[\frac{\partial P}{\partial Y}\frac{\partial Y}{\partial y_j}\frac{y_j}{P} + 1] - w_m = 0 \qquad \text{for } m = CI, L, K \text{ and } j = 1,...,n \qquad [5]$$

An easier economic interpretation of these first-order conditions can be obtained by using the conjectural elasticity and the price elasticity of total output demand.

Let's first define $\theta_j = (\partial Y/\partial y_j)(y_j/Y)$ as the conjectural elasticity of the total industry output with respect to the jth firm's output. This elasticity involves both firm j's share in the total industry output (y_j / Y) and its conjectural variation ($\partial Y / \partial y_j$). This latter reflects the beliefs of firm j about its rivals' reactions to its own output choice. Hence, if firm j behaves as a price-taker in the output market then both its conjectural variation and its conjectural elasticity are equal to zero. At the other hand of the spectrum, under pure monopoly (i.e. when $y_j = Y$), the conjectural variation of firm j as well as its conjectural elasticity are equal to unity. Finally, the intermediate case of Cournot oligopoly occurs when the conjectural variation of firm j equals 1. As a result, its conjectural elasticity corresponds to its total industry output share. Therefore the conjectural elasticity varies from 0 to 1 and may be used to identify firms' behaviours.

Second, let us define $\eta = (\partial Y/\partial P)(P/Y)$ as the absolute value of the price elasticity of total output demand. Thus, expressing equation [5] in terms of these both elasticities give :

$$P\frac{\partial y_j}{\partial x_{mj}}[1 - \frac{\theta_j}{\eta}] - w_m = 0 \qquad \text{for } m = CI, L, K \text{ and } j = 1,...,n \qquad [6]$$

Assuming positive marginal products and zero conjectural elasticity θ_j boil down to the perfectly competitive case where each firm equates the marginal product of each input to its real price. In other situations, the optimal mark-up pricing rule changes as the optimal mark-up for firm j (θ_j / η) varies according to the degree of competitiveness in the output market. Thus, if θ_j equals 1, we obtain the monopoly case where the optimal mark-up for firm j corresponds to the inverse of the price elasticity of market output demand (in absolute value). Other values of θ_j relates to various oligopolistic behaviours implying different levels of optimal mark-up for firm j.

Indeed the level of the optimal mark-up reflects the extent to which firm j can exert market power when selling its output. Hence, the ratio of the conjectural elasticity to the price elasticity of output demand is defined as a measure of each firm's market power in the output market.

In practice, as firm-level data are not available, the model defined above for each firm j cannot be estimated. As we have to work with industry-level data, a more restrictive specification is required. Following Appelbaum (1982), it is assumed that at equilibrium, conjectural elasticities are the same for all firms, i.e. that $\theta_j = \theta \quad \forall j = 1,\ldots,n$. Hence, the agregate relation corresponding to equation [6] above may be rewritten as :

$$P\frac{\partial Y}{\partial x_m}[1-\frac{\theta}{\eta}] - w_m = 0 \qquad \text{for } m = CI, L, K \qquad [7]$$

where $Y = \sum_j y_j$ and $\frac{\partial Y}{\partial x_m} = \sum_j \frac{\partial y_j}{\partial x_{mj}}$

Thus, the ratio θ / η represents the industry-wide index of market power in the output market (Azzam and Pagoulatos, 1990).

3. Empirical model specification

Functional forms for the output demand function as well as for the industry production function have to be selected in order to test the pricing behaviour and to measure the market power in various French food processing industries. Following Appelbaum (1982), we specify the output demand function faced by each food manufacturing industry as a constant elasticity demand function :

$$\ln Y = a - \eta \ln(P/S) + b\ln(GNP/S) \qquad [8]$$

where *GNP* is the French gross national product in current Francs and *S* the implicit GNP price deflator (1980=100).

The industry production function is approximated by a Translog form, such as :

$$\ln Y = \beta_0 + \sum_m \beta_m \ln x_m + 1/2 \sum_m \sum_l \beta_{ml} \ln x_m \ln x_l \quad \text{for } m \text{ and } l = CI,\ L,\ K \qquad [9]$$

In this case, the marginal product for the mth factor is :

$$\partial Y / \partial x_m = \beta_m + \sum_l \beta_{ml} x_l \qquad \text{for } m \text{ and } l = CI,L,K \qquad [10]$$

By using the first-order conditions [7] and by rearranging its terms, we obtain the following full model including four equations to be estimated (the production function and three input share equations) :

$$\begin{aligned} y_j = {} & \beta_0 + \beta_{CI} \ln(x_{CI}) + \beta_L \ln(x_L) + \beta_K \ln(x_K) + \\ & + (1/2)\beta_{CICI} \ln(x_{CI})^2 + (1/2)\beta_{LL} \ln(x_L)^2 + (1/2)\beta_{KK} \ln(x_K)^2 \\ & + \beta_{CIL} \ln(x_{CI})\ln(x_L) + \beta_{CIK} \ln(x_{CI})\ln(x_K) + \beta_{LK} \ln(x_L)\ln(x_K) \end{aligned} \qquad [11]$$

where the β coefficients are the parameters to be estimated. Note that this production function specification implicitly imposes symmetry conditions.

$$\begin{aligned} S_{CI} &= (1-(\theta/\eta))(\beta_{CI} + \beta_{CICI} \ln x_{CI} + \beta_{CIL} \ln x_L + \beta_{CIK} \ln x_K) \\ S_L &= (1-(\theta/\eta))(\beta_L + \beta_{CIL} \ln x_{CI} + \beta_{LL} \ln x_L + \beta_{LK} \ln x_K) \\ S_K &= (1-(\theta/\eta))(\beta_K + \beta_{CIK} \ln x_{CI} + \beta_{LK} \ln x_L + \beta_{KK} \ln x_K) \end{aligned} \qquad [12]$$

where $S_m = w_m x_m / PY$ (for m =*CI,L,K*) defines the industry expenditures for the mth input relative to the value of the total industry output.

For empirical implementation a disturbance term is added in each equation. The errors are assumed to be additive and jointly normally-distributed with zero mean and constant variance-covariance matrix. One may underline that in the model embodied in [11] and [12], output and inputs are endogenous. So we use the method of instrumental variables. In order to facilitate the estimation process and to avoid the occurence of non convergent solutions, the above empirical model is estimated in two stages. First, the output demand equation is estimated to yield an estimate of the output demand elasticity η which is fed in the share equations [12]. Then, the remaining equations [11] and [12] are estimated as a system.

4. Data and empirical results

For empirical application, we retain the "NAP 600" level nomenclature of the French National Accounts so that we work with sufficiently homogeneous food processing sectors.

Estimating the system of equations [11] and [12] for various French food manufacturing industries requires time series data on the level of each input (i.e. x_m for m

$=CI,L,K$) used by each industry. Such data cannot be directly observed (except for labour) since accounting data obtained from the annual surveys of French food manufacturing firms conducted by the "Service Central des Enquêtes et Etudes Statistiques" (SCEES) only provide individual input expenditures for each industry (i.e. $w_m x_m$ for $m = CI,L,K$). On the other hand, the system of National Accounts (administered and managed by INSEE) provides data series allowing to compute price indices for intermediate input and capital inputs but at an agregate level for the food manufacturing as a whole. For capital input, such an agregate price index can be considered as a proxy variable for w_K and used to compute the corresponding input level x_K in each French food processing industry. Applying the same procedure to compute the level of intermediate inputs used in each food processing industry raises more problems.

Farm inputs used to produce final food products vary greatly in nature, so do their corresponding cost shares across food processing industries. Therefore it is unrealistic to use an agregate price index for intermediate inputs as a « proxy » to be used for each food processing sector. This would result in a strong bias in the resulting intermediate consumption level series and in the estimation of the empirical conjectural variations model. So, we did not retain this procedure herein. An alternative method is to « proxy » the price of intermediate inputs (i.e. w_{CI}) in each food manufacturing industry by an average (weighted if possible) index of purchasing prices of the main farm products its uses. Obviously, this method may result in a quite inaccurate approximation of the variable w_{CI} in industries where the share of farm inputs used in the total consumption of intermediate products is small relative to the share of non-farm intermediate inputs.

Nevertheless, this method is the one adopted here. To alleviate potential bias resulting from such an approximation of w_{CI}, we only consider, in the empirical analysis, the French food processing industries where the share of farm input costs represents a significant portion of firms' total expenses. Furthermore, among those selected food processing industries, we keep the ones for which a purchase price of farm inputs is directly observable from French National Accounts managed by INSEE. The end-result of this data search and selection process was to retain six French food processing industries including poultry meat, canned fruits, canned vegetables, canned seafood, pasta and malt industries[4].

The data used in the estimation of the system of equations [9], [11] and [12] are annual agregate time series covering the period 1978-1993. As already mentionned, data series on output values, the value of intermediate inputs used, labour and capital expenditures (measured in current French Francs) are provided by the annual business surveys of French food manufacturing firms conducted by SCEES. From the French National Accounts

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4 The farm or raw material used by these selected food processing industries is poultry for poultry meat processing, an agregate raw fruit input for canned fruits, an agregate raw vegetable input for canned vegetables, an agregate raw seafood input for canned seafood, durum wheat input for pasta production and barley input for malt processng.

(INSEE), we obtain data information on GNP, output price index and purchasing farm input price index for each food processing industry under study, the implicit GNP price deflator and the capital price index (all price indices were set to 100 in 1980). Note that the sample period is dictated by data availability since the SCEES data base covers the period 1977-1993 while output price indices provided by the National Accounts are available from 1978 onwards.

The output demand equations, given by equation [9] have first been estimated, using the ordinary least squares method. All demand parameters (not reported for lack of space) are statistically significant at the five percent level for all selected food processing industries. The estimated price elasticities of output demand faced by each industry are reported in table 1. Except for poultry, the estimated price elasticities are smaller than one in absolute values and similar to those obtained by Lavergne *et al.* (1996). With an estimated price elasticity of -1.40, the output demand for poultry meat is rather elastic. This result differs very much from the price elasticity estimated by Lavergne *et al* which is -0.29.

Table 1. Estimated price elasticities of output demand

Food processing industries		Price elasticity of demand η
NAP number	Name	
3505	Poultry meat	-1.40 (*)
3701	Canned fruits	-0.44
3702	Canned vegetables	-0.54
3703	Canned seafood	-0.62
3904	Pasta	-0.72(*)
3906	Malt industry	-0,015

* estimate obtained after correction for first-order serial correlation.

The estimated values of the price elasticity of output demand are used as constant deterministic parameters in the estimation of the system of equations given by expressions [11] and [12]. Each regressor in these equations are first regressed against the following instrumental variables : input prices, one year lagged input use quantities, the GNP level and a time trend. The iterative non-linear three-stage least squares technique was used for estimation.

Empirical results for canned seafood, pasta and malt industries were not satisfactory from a statistical standpoint and inconsistent with respect to the model's theoretical requirements. Consequently, the estimated parameters pertaining to these three food processing industries are not reported here. Table 2 only presents the empirical results for those industries for which all estimated parameters have the right signs in conformity with the model's theoretical requirements.

An inspection of Table 2 reveals that for the canned vegetables industry, all but 3 parameters are statistically significant at least at the 5 % level. For the other two food processing industries, fewer parameters are statistically significant. Hence, out of the eleven parameters estimated for the poultry processing industry, only three are statistically significant at the 5 % level and five at the 20 % level. In the canned fruits industry, the corresponding number of significant coefficients are respectively 5 and 8.

Table 2. Estimated parameters of the model
(standards error in parentheses)

Parameters	Poultry meat	Canned fruits	Canned vegetables
β_0	-1.28 (0.55)	-1.75 (0.76)	1.324 (2.38)
β_{CI}	1.013 (0.29)	1.136 (0.34)	-0.601 (0.36)
β_L	0.562 (0.77)	0.366 (0.22)	1.151 (0.22)
β_K	-0.281 (0.16)	-0.165 (0.20)	0.778 (0.23)
$\beta_{CI\,CI}$	0.013 (0.42)	0.088 (0.09)	0.405 (0.05)
β_{LL}	-0.06 (0.49)	0.060 (0.03)	0.066 (0.01)
β_{KK}	-0.015 (-0.01)	0.087 (0.03)	0.154 (0.02)
$\beta_{CI\,L}$	$-0.880*10^{-2}$ (-0.04)	-0.014 (0.04)	0.031 (0.02)
$\beta_{CI\,K}$	$-0.862*10^{-2}$ (0.02)	-0.065 (0.04)	-0.217 (0.03)
β_{LK}	0.019 (0.019)	-0.039 (0.02)	-0.062 (-0.01)
θ	0.139 (0.02)	0.089 (0.03)	0.106 (0.02)

It is worth stressing that in all three industries, the conjectural elasticity parameters have estimated values and signs consistent with theoretical requirements and in addition, are statistically different from zero. Such results indicate that the hypothesis of price-taking conduct in the output market is rejected for the French poultry meat, canned fruits and canned vegetables industries. The null hypothesis of pure monopoly behaviour ($H_0 : \theta = 1$) is also rejected for the three industries since the corresponding calculated t-ratios (43.05, 30.37 and 44.70 for poultry meat, canned fruits and canned vegetables industries respectively) are above the 1 % value 2.7, for a Student *t* distribution with 53 degrees of freedom.

Estimates of conjectural elasticities and price elasticities of output demand can next be used to measure the market power exerted by these three food processing industries. As it was previously shown, the measure of market power is the ratio of the conjectural elasticity over the price elasticity of output demand (i.e. θ / η). This ratio is presented in Table 3 for the three industries.

Table 3. Estimated degrees of market power

NAP number	Name of the industry	degree of market power
3505	Poultry meat	0.099
3701	Canned fruits	0.202
3702	Canned vegetables	0.196

Although conjectural elasticity estimates suggest that French poultry meat, canned fruits and canned vegetables industries may be characterised as non-competitive in their own output markets, table 4 indicates that their respective market power was relatively low during the sample period. The market power in canned fruits and vegetables industries is similar and higher that the one observed in the poultry meat industry. For this latter, the low degree of oligopoly power directly relates to the high estimated absolute value of the price elasticity of demand.

5. Concluding comments

In this paper, an attempt to measure market power in French food manufacturing was made. To do so, the conventional conjectural variations model was applied to several French food processing industries. The empirical implementation of this model was undertaken assuming i) a single output technology represented by a production function and ii) an oligopolistic structure in the final output market. Due to data limitations, this model could only be estimated for six food processing sectors. The empirical results did not fare very well. Reliable and interpretable results were only obtained for three industries - poultry meat, canned fruits and canned vegetables - out of the six selected. Our results indicate the presence of some "oligopolistic" market structure. However, the market power indicator shows that this market structure do not depart very much from the the perfectly competive market paradigm.

Due to these mitigated empirical results, should we conclude that this preliminary experiment fails ? Before we give a definite answer to this question, we plan to improve the empirical exercise in the following directions. First, we intend to improve the data information sources concerning the prices and the quantity consumed of raw agricultural inputs so that we could reduce any potential bias resulting from data measurement errors. Second, the model estimated so far was developed assuming that there was only one source of market power. As it has been demonstrated by others, food processing firms could also exert market power on the raw agricultural markets. In addition, in the case of France, exports of processed food products towards the rest of the European Union represent a significant outlet for French food processing firms and one can wonder whether these firms could use the export outlet as an additional source of market power. Given these considerations, it is our intention to develop and estimate a conjectural variation model able to capture these three sources of market power.

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