Competition in markets with dominant firms: a note on the evidence from the Italian banking industry

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ABSTRACT

In this paper we consider the Italian banking industry, where the eight largest firms operate at a national level, manage about a half of total loans, and have a notably larger dimension than the other competitors. We estimate a structural model containing a behavioural parameter, in order to assess the market conduct of the largest banks for the period 1988-2000. Our finding is that, in spite of their noteworthy size and significant market share, these banks have been characterised by a more competitive conduct than the Bertrand-Nash outcome: this is in line with the results of the latest literature of the field, for which in the banking industry there is often no conflict between competition and concentration.

KEYWORDS: Banking; Competition; Market structure

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1. Introduction[*]

In the past two decades, European banking markets have been subjected to structural changes, due to modifications occurred in the external environment: particularly, the liberalisation of capital flows and the prospect of a common market have influenced the policy of the domestic banks. This has pushed them to search for more efficient organisational solutions, greater variety of the offered services and stronger exploitation of scale economies. The last of these phenomena has taken place especially thanks to an increasing consolidation, and has led to a fall in the number of banks.

It is crucial to assess whether such modifications have had an impact on the degree of competition characterising the banking industry, because of the potential for monopoly power that the consolidation process could produce. This paper aims to evaluate the degree of competition of the eight Italian largest banks (the only operating throughout the whole country, and also involved in many mergers and acquisitions) during the period 1988-2000, and thus shed light on the possibility that few important banks use their dimension and market leadership to act as colluding oligopolists.

The next section gives a brief picture of the structural evolution of the Italian banking industry over the recent years, and presents our conjectural variation model. Section 3 describes the sample characteristics and discusses the estimation results. Some conclusions are given in the last section.

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2. A conjectural variation model of competition for the Italian banking market

Over the last fifteen years, a profound process of consolidation occurred in the Italian banking industry, giving rise to significant transformations. Commercial banks have been forced to search for scale and scope economies, with the aim of increasing their efficiency. As a consequence, from 1988 to 2000 the number of commercial banks dropped from 1100 to 841. Moreover, in the decade 1990-2000 there were 356 mergers or acquisitions. The belief of the Central Bank of Italy is that in the national banking industry (characterised by a prevalence of small-scale banks) there is room for exploiting wide scale economies, without prejudice to the market niches of local little banks. At the same time, mergers and acquisitions are considered as a beneficial solution compared to the closure of inefficient banks, since their exit is expected to involve economic and social costs.

In spite of the outlined changes, commercial banks have been able to maintain their outstanding role in the Italian financial system: actually, the reduction in the number of banks has been balanced by a remarkable increase in the number of branches. Such transformations have also amplified the concern that the reorganisation may have adverse consequences on competition, as a result of the bigger market power gained by leading banks through mergers, so casting doubts on the possibility that a competitive conduct among Italian banks is still possible[1]. The above point emphasises the major role that an empirical investigation could play in assessing the degree of competition in an industry. The economic literature offers various techniques for exploring the issue[2].

This study tries to verify whether Italian largest banks enjoy some market power, in the sense of price-cost margins. Actually, in Italy only eight banks can be considered as "national", meaning that their reference market is the whole country, while the other banks generally have a much more limited area of business. On the other side, the data show that local banking markets are mainly

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[1] This fear derives from the structure-conduct-performance (SCP) paradigm, where the degree of competition in a market is a direct function of the number of firms and an inverse function of the average market share. However, the occurrence of certain conditions can lead to alternative results, like contestability. For details on the above theories, see Stigler (1964) and Baumol, Panzar and Willig (1982).

[2] With particular reference to the banking industry, surveys are given by Cetorelli (1999) and Coccorese (2002).

oligopolies, where the most powerful firms are small-size banks[3]. In this picture, the role of the largest (i.e. national) banks needs to be ascertained. They are surely able to exercise competitive pressures also in local concentrated markets thank to their dimension and the resulting possibility of enjoying scale economies, which could balance the lack of territorial roots and information about the local clientele. Moreover, the significant proportion of managed deposits and loans could induce them to cooperative agreements in order to better exploit their dominant position and act as leaders. Finally, in the last years they have been characterised by an outstanding consolidation trend (mergers and acquisitions) that has allowed them to gain access to local markets too.

Hence, in the following analysis, we focus on the eight largest banks, and treat them as the only firms in the market, together with the group of all the remaining banks that we identify as a ninth competitor. This assumption is approximately correct considering the above description of the Italian banking industry. In spite of the many banks operating at a local level, the “national” market is an oligopoly where only the eight main banks can compete: they can exploit scale economies and rely on a good and established reputation, also secured by their dimension (they manage about half of total loans) that avoids the threat of new entries. Nonetheless, the role of the other banks is still potentially important, and the behavioural parameter we are going to estimate can detect it, given that we incorporate them as an aggregate entity in our analysis.

We employ a price-setting model, thus assuming product differentiation between firms as well as price competition. Each bank is supposed to face the following demand function:

$$q_{it} = q_{it}(p_{it}, p_{jt}, D_{it}), \qquad i = 1, \ldots, N \tag{1}$$

where q_{it} is the quantity demanded, p_{it} is the price charged by bank i, p_{jt} is an index of the competitors’ prices, D_{it} is a vector of exogenous factors which affect demand, and N is the number of banks here considered (therefore, nine).

[3] This situation is analysed and explained by Di Battista and Grillo (1988), and Coccorese (1998), p. 185-186.

For each bank, we use a weighted average price of the other eight banks as a proxy of the opponents' price. In this way, we treat the market for loans as a duopolistic market, where each firm faces a single rival whose dimension is the average dimension of the eight remaining banks, and therefore the demand for each firm depends only on the average price of this group of firms[4]. We expect that the own-price elasticity of demand is negative, while its magnitude reflects whether consumers regard the loans of the considered banks as poor or good substitutes. We also expect that the own-price elasticity is larger than the cross-price elasticity, if we admit that banks are able to soften price competition by providing other fringe services. It seems important to take into account the reaction of customers through the evaluation of the elasticity coefficients: the possibility of exploiting some market power would surely force banks toward an increase in loan rates, but in this case a high demand elasticity would also remarkably reduce the demand for loans.

The cost function is assumed to be affected by the output q_{it} and the price ω_{it} of input factors:

$$C_{it} = C_{it}\left(q_{it}(\cdot), \omega_{it}\right). \tag{2}$$

Omitting the time subscript for notational convenience, the profit function can be written as:

$$\pi_i = q_i(\cdot)\, p_i - C_i\left(q_i(\cdot), \omega_i\right). \tag{3}$$

The maximisation program implies that

$$\frac{\partial \pi_i}{\partial p_i} = q_i + \left(p_i - MC_i(\cdot)\right)\left(\frac{\partial q_i}{\partial p_i} + \frac{\partial q_i}{\partial p_j}\frac{\partial p_j}{\partial p_i}\right) = 0, \tag{4}$$

where $MC_i(\cdot) = \dfrac{\partial C_i}{\partial q_i}$ is the marginal cost function. Rearranging (4), we get:

[4] See also Roller and Sickles (2000), p. 849.

$$\frac{p_i - MC_i}{p_i} = -\frac{1}{\varepsilon_{ii} + \lambda \varepsilon_{ij} \frac{p_i}{p_j}}. \tag{5}$$

Here $\varepsilon_{ii} = \frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i}$ and $\varepsilon_{ij} = \frac{\partial q_i}{\partial p_j}\frac{p_j}{q_i}$ are the own-price elasticity and the cross-price elasticity of demand, respectively, and $\lambda = \frac{\partial p_j}{\partial p_i}$ is the conjectural variation parameter of firm *i*. If identified, this derivative expresses the degree of coordination of banks. A positive value of λ indicates that a firm expects the rivals to match its price, thus cooperating in holding revenues at a profitable level. Perfectly collusive behaviour is characterised by a unit value of λ. When $\lambda = 0$, the behaviour is coherent with a Nash equilibrium in prices: each firm does not consider rivals' choices when setting its price, and does not react to changes in the other firms' behaviour. Finally, a negative conjectural derivative means that a firm contemplating a price increase expects its rivals to react in a competitive fashion by reducing their prices[5]. Perfect competition implies that $\lambda = -\infty$, what changes expression (5) in the well-known $p = MC$ condition.

The conjectural variation index λ is identified in the system formed by equations (1), (2) and (5). With reference to costs, we consider a translog function, which is common in the analysis of banking markets. Given *m* generic inputs and one output, firm *i*'s total cost function is therefore:

$$\ln C_i = \beta_0 + b_0 \ln q_i + \frac{b_1}{2}(\ln q_i)^2 + \sum_{r=1}^{m} \beta_r \ln \omega_{ri} + \ln q_i \sum_{r=1}^{m} b_{r+1} \ln \omega_{ri} +$$

$$+ \frac{1}{2}\sum_{r=1}^{m}\sum_{s=1}^{m} \beta_{m+r+s-1} \ln \omega_{ri} \ln \omega_{si}. \tag{2a}$$

Such a cost function implies the following marginal cost function:

$$MC_i = \frac{\partial C_i}{\partial q_i} = AC_i \left(b_0 + b_1 \ln q_i + \sum_{r=1}^{m} b_{r+1} \ln \omega_{ri} \right), \tag{7}$$

where AC_i is the average cost and ω_{ri} are the prices of input factors[6] (r = 1, ..., m).

The bank-specific demand function, corresponding to (1), is postulated to be as follows:

$$\ln q_i = a_0 + a_1 \ln p_i + a_2 \ln p_j + a_3 \ln Y + a_4 \ln BR_i + \varepsilon_i \,, \tag{1a}$$

where q_i and p_i are the quantity and the price of the output of bank i, respectively, p_j is the calculated average value expressing the price of all the other banks, Y is national income (a measure of economic activity), BR_i is the number of branches[7] of bank i (a variable that tries to capture the network size effect of the firm on its own demand).

Concerning the translog cost function, we will use a three-factor specification (including deposits, labour and physical capital):

$$\ln C_i = \beta_0 + b_0 \ln q_i + \frac{b_1}{2}(\ln q_i)^2 + \sum_{r=1}^{3} \beta_r \ln \omega_{ri} + \ln q_i \sum_{r=1}^{3} b_{r+1} \ln \omega_{ri} +$$

$$+ \sum_{r=1}^{3} \beta_{r+3} (\ln \omega_{ri})^2 + \beta_7 \ln \omega_{1i} \ln \omega_{2i} + \beta_8 \ln \omega_{1i} \ln \omega_{3i} + \beta_9 \ln \omega_{2i} \ln \omega_{3i} + \varphi_i \;. \tag{2b}$$

It is not possible to predict the sign of the coefficients of the variables in (2b), but some conditions are often requested to be satisfied[8]. While the above formulation makes possible to avoid the test for symmetry[9], a proper identification of λ requires that linear homogeneity in input prices

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[5] See Martin (1993), p. 25.

[6] Here we assume the intermediation model of a bank, where deposits are considered an intermediate input in the production of loans, in conjunction with other factors. See Klein (1971) and Sealey and Lindley (1977).

[7] The insertion of this variable does not cause endogeneity bias if we assume that, in any given year, the number of branches of each bank is predetermined. Actually, a high correlation between branches and GDP might weaken the significance of the coefficient of both variables because of multicollinearity. However, this should not occur in our estimation, given that the correlation coefficient between BR_i and Y is 0.0878.

[8] For example, see Berger *et al.* (1987).

[9] Symmetry in the coefficients of produced goods is ruled out by the fact that we consider only one output (loans). Symmetry in the coefficients of input prices would be necessary if we estimate different parameters both for $\ln\omega_r \ln\omega_s$ and $\ln\omega_s \ln\omega_r$, (r = 1,...,m; s = 1,...,m), like in (2a), rather than only one coefficient for each pair of multiplications, as we do by using the function (2b).

is imposed on the marginal cost function[10]. In our model, this is obtained by setting the following five restrictions on equation (2b): $\beta_1 + \beta_2 + \beta_3 = 1$, $b_2 + b_3 + b_4 = 0$, $\beta_6 = \beta_4 + \beta_5 - 2\beta_7$, $\beta_8 = -\beta_4 - \beta_7$ and $\beta_9 = -\beta_5 - \beta_7$.

Given the above cost function, and substituting (7) in (5), simple manipulations yield:

$$p_i = AC_i\left(b_0 + b_1 \ln q_i + \sum_{r=1}^{3} b_{r+1} \ln \omega_{ri}\right) - \frac{1}{\frac{a_1}{p_i} + \lambda \frac{a_2}{p_j}} + \phi_i \quad . \tag{5a}$$

Hence, the system to be estimated (labelled as Model 1) is formed by equations (1a), (2b) and (5a). The λ index reflects the average behaviour of the banks considered: therefore, the presence of a collusive (competitive) behaviour should give rise to positive (negative) values of λ[11].

Given the nature of our dataset, it seems appropriate to estimate also an alternative model, which tries to capture firm-specific and time effects. For this purpose, we propose another system (Model 2), composed by the following three equations:

$$\ln q_i = a_1 \ln p_i + a_2 \ln p_j + a_3 \ln Y + a_4 \ln BR_i + a_5 t + \sum_{k=1}^{8} a_{k+6} BD_k + \varepsilon_i \tag{1b}$$

$$\ln C_i = b_0 \ln q_i + \frac{b_1}{2}(\ln q_i)^2 + \sum_{r=1}^{3} \beta_r \ln \omega_{ri} + \ln q_i \sum_{r=1}^{3} b_{r+1} \ln \omega_{ri} + \sum_{r=1}^{3} \beta_{r+3} (\ln \omega_{ri})^2 +$$
$$+ \beta_7 \ln \omega_{1i} \ln \omega_{2i} + \beta_8 \ln \omega_{1i} \ln \omega_{3i} + \beta_9 \ln \omega_{2i} \ln \omega_{3i} + \beta_{10} t + \sum_{k=1}^{8} \beta_{k+11} BD_k + \varphi_i \tag{2c}$$

[10] See Bresnahan (1989), p. 1034.

[11] Shaffer (2001) has shown that, when applying the Bresnahan-Lau technique, the estimated conduct parameter is biased when the sample fails to span the entire market. This does not happen in our model, where the market under examination is the whole country and the eight largest banks plus the residual group can be regarded as the only competitors.

$$p_i = AC_i\left(b_0 + b_1 \ln q_i + \sum_{r=1}^{3} b_{r+1} \ln \omega_{ri}\right) - \frac{1}{\dfrac{a_1}{p_i} + \lambda \dfrac{a_2}{p_j}} + \gamma_1 t + \phi_i \qquad (5b)$$

Here, a linear time trend has been added in all equations to account for the economic expansion. Furthermore, in the demand and cost equations the intercept term has been substituted by bank-specific dummy intercepts (*BD*).

Other two models have been estimated with the purpose of isolating the effects due either to time or firms' specificity[12]. Model 3 contains the dummy variables BD_k, without the time trend. In Model 4 we consider the time trend, but omit the *BD* variables[13].

3. *Data and estimation*

The sample considers the period 1988-2000, and for each year data have been collected for the eight nationwide banks[14] and for the remaining group of banks (therefore considered as a whole). Hence, it consists of 117 observations for each regression.

In the demand equations (1), the quantity of output for each bank, q_i, is measured by the value of loans, and the price of output for that bank, p_i, is given by the interest rate earned on loans, which is calculated as the ratio between interest revenue and total loans. An analogous procedure is followed for the calculation of p_j: accordingly, the price of the rivals is still computed as an average interest rate on loans (given by the ratio between the interest revenue of all the "other" banks and their loans). Its coefficient is expected to be positive if loans are substitutable across banks. The coefficients of Y (measured by the Gross Domestic Product) and BR_i (the number of branches) are expected to have a positive influence on the level of banking services demand.

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[12] Of course, linear homogeneity in input prices has been again imposed on the coefficients of the cost equations.

[13] A number of slightly different models has been additionally estimated. The results are reported in Coccorese (2002).

[14] They are: Banco di Napoli, Banca Nazionale del Lavoro, Banca di Roma, Cassa di Risparmio delle Province Lombarde, Banca Commerciale Italiana, Credito Italiano, Monte dei Paschi di Siena, Istituto Bancario San Paolo di Torino. These banks are regarded as "largest" also in the statistics of the Central Bank of Italy.

As already stated, the inputs considered here are deposits, labour and physical capital[15]. In equations (2) and (5), the price of deposits, ω_{1i}, is measured as the ratio between interest expenses and deposits; the price of labour, ω_{2i}, is calculated as the ratio between total labour costs and the number of employees; the price of physical capital, ω_{3i}, is computed as the value of all net operating costs different from those related to deposits and labour, divided by the funds under management, a ratio that represents a good proxy for the unit cost of capital. Lastly, the average cost AC_i is calculated as the ratio between total costs and loans.

All variables (in euro) are expressed in 1995 values and were deflated by the Gross Domestic Product deflator[16]. Systems are estimated simultaneously through non-linear three-stage least squares. Table 1 displays the estimation results.

In the demand equation the coefficients of p_i and p_j have the expected sign (negative and positive, respectively), and are both statistically significant, always at the 1% level. Therefore, the empirical evidence confirms a downward-sloping demand function as well as a positive cross-price elasticity for loans. The estimated value of both the coefficients of p_i and p_j drops when the bank-specific dummies *BD* are included: particularly, without these coefficients the demand for loans appears to be elastic, given that we reject the hypothesis that $a_1 \leq |1|$. The cross-price elasticity is always smaller than the absolute own-price elasticity, confirming our expectations that loans are more sensitive to variation in p_i rather than in p_j. However, the difference between the two values is never remarkable, and this fact could be a first indicator of a noteworthy level of competition among banks. The variable *Y* has a positive and statistically significant coefficient only when the time trend is included in the equations. The coefficient of BR_i is positive and significant, meaning that a wider branch network allows a larger increase in the demand for loans of bank *i*.

[15] For a correct specification of λ, we will assume that banks are input price takers. Shaffer (1999) has shown that any monopsony power would generate less-competitive estimates of λ, thus attributing any unmeasured monopsony power to an imperfection of competition on the output side. Accordingly, estimates rejecting the hypotheses of joint monopoly and Nash behaviour are robust to relaxing the assumption that banks are input price-takers.

[16] Summary statistics of the data and the list with the names of the variables are available from the author upon request.

In the cost equation, the estimated coefficients show that banks are operating where average costs lie above marginal costs, that is, in a region of economies of scale. This finding suggests that new entries in the "national" market, if possible, are unattractive because of the presence of a notable size effect. For this equation, the linear time trend is highly significant in all regressions and captures a cost reduction.

The value of the average conjectural parameter λ is always negative and significant at least at the 5% level. Its value ranges from -4.4599 to -3.1518. All the estimated values are significantly different from +1 and 0 at the 5% level. As a consequence, we are able to reject the hypothesis that in the Italian banking industry there is evidence of monopoly power or coordination between banks. Furthermore, banks' behaviour appears to be more competitive than in a Nash equilibrium in prices. Therefore, the results show that in Italy the banking market is characterised by a certain degree of competition, although imperfect. This conjecture agrees with the results of other studies that investigate the market power of Italian banks in the same years. Actually, some of them have shown that monopolistic competition is the best description of the local banking market[17].

Hence, even though no threat of possible entrants should exist (given the existence of scale economies), the estimated degree of competition, always lying between the perfectly competitive and the Nash values, indicates a fairly competitive pattern of behaviour. This can be deduced also by calculating the mark-up over marginal costs in equation (5a). For example, in Model 1 it is equal to 16.6%, and in Model 3 to 32.2%: considering that the Bertrand-Nash behaviour ($\lambda = 0$) implies a mark-up of 67.2% and 117.7%, respectively (and the cartel hypothesis much higher), pricing in the considered banking market appears rather competitive. Our results seem therefore to support the policy of the Central Bank of Italy, which has cautiously favoured a tendency to concentration in

[17] See Coccorese (1998), Bikker and Haaf (2002) and De Bandt and Davis (2000). Coccorese (2003) finds evidence of a relationship between the local economic performance and the degree of competition among banks: they appear to behave as perfectly competitive firms where local macroeconomic data show lower unemployment rates, greater per capita GDP and lower market loan rates.

the Italian banking industry during the last years (in accordance with the Antitrust Authority), also when it involves large banks.

Finally, when included, the estimated time trend for the third equation is highly significant, and shows a fall in the price-cost margin during the years under exam. Considering Model 4, we note that the average mark-up over marginal costs is equal to 15.1%. Along with equation (5b), we can decompose this value in two parts: the first is related to the behavioural parameter λ, amounting to 16.3% (very close to 16.6% estimated for Model 1); the second reproduces the time effect, being equal to -1.2%. Hence, the introduction of the time trend provokes a 7% fall in the mark-up value, and can be interpreted as an additional signal of increased competition among banks.

4. Conclusion

This paper has relied on a non-linear simultaneous-equation model for the period 1988-2000 (formed by a demand equation, a cost equation and a price-cost margin equation) in order to identify the degree of competitiveness characterising the eight Italian largest banks, the only ones which operate nationwide and have a noteworthy size and a significant market share. The results strongly reject the hypothesis of collusion or coordination among them, and are consistent with a more competitive conduct than the Nash outcome.

Given the special features of the banking industry (asymmetric information, personal relationships between banks and customers, reputation), it seems that the degree of competition is considerable. Our findings are in line with the results of the recent literature in this field as well as with those of other studies on Italian data, and contradict the conclusions of the SCP approach, for which the tendency to concentration in a market is to be considered with concern for its anti-competitive consequences. Quite to the contrary, our empirical evidence shows that in the Italian banking industry there is no conflict between competition and concentration.

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Table 1 – System estimation results

		Model 1	Model 2	Model 3	Model 4
DEMAND EQUATION (dependent variable: $\ln q_i$*)*					
$\ln p_i$	a_1	-1.4877*** (-7.06)	-0.8855*** (-6.10)	-0.8494*** (-5.65)	-1.7057*** (-8.56)
$\ln p_j$	a_2	1.1875*** (4.44)	0.7384*** (4.26)	0.6677*** (3.68)	1.4423*** (5.60)
$\ln Y$	a_3	-1.5245 (-1.57)	4.0556*** (2.77)	-0.5324 (-0.76)	5.4929** (2.14)
$\ln BR_i$	a_4	0.7292*** (28.98)	0.6823*** (9.10)	0.5935*** (8.14)	0.7572*** (30.96)
t	a_5	-	-0.0758*** (-3.38)	-	-0.1099*** (-3.04)
Intercept	a_0	43.2834** (2.20)	-	-	-100.8448* (-1.92)
Adj. R^2		0.8824	0.9619	0.9581	0.8891
COST EQUATION (dependent variable: $\ln C_i$*)*					
$\ln q_i$	b_0	-0.2577 (-0.21)	0.0419 (0.14)	0.0767 (0.24)	0.0487 (0.08)
$(\ln q_i)^2$	b_1	0.1322*** (3.92)	0.0155* (1.90)	0.0176* (1.94)	0.0197 (1.20)
$\ln \omega_{1i}$	β_1	0.2283 (0.20)	0.6933 (1.39)	-0.0454 (-0.08)	1.9041** (2.58)
$\ln \omega_{2i}$	β_2	1.5820 (0.56)	0.7773 (0.60)	-0.2884 (-0.20)	0.1889 (0.11)
$(\ln q_i)(\ln \omega_{1i})$	b_2	-0.0421 (-0.54)	-0.0538*** (-2.68)	-0.0042 (-0.21)	-0.1293*** (-3.04)
$(\ln q_i)(\ln \omega_{2i})$	b_3	-0.1270 (-1.05)	0.0694** (2.39)	0.0348 (1.07)	0.0942 (1.57)
$(\ln \omega_{1i})^2$	β_4	-0.1865** (-2.00)	-0.0880 (-1.60)	-0.0913 (-1.57)	-0.1014 (-1.42)
$(\ln \omega_{2i})^2$	β_5	0.0408 (0.32)	-0.1498 (-1.47)	-0.0298 (-0.27)	-0.1327 (-1.23)
$(\ln \omega_{1i})(\ln \omega_{2i})$	β_7	0.1311 (1.60)	0.0793 (1.44)	0.0872 (1.50)	0.0746 (1.16)
t	β_{10}	-	-0.0323*** (-6.52)	-	-0.0565*** (-12.38)
Intercept	β_0	6.5066 (0.31)	-	-	7.7669 (0.70)
Adj. R^2		0.9658	0.9870	0.9833	0.9810
PRICE-COST MARGIN EQUATION (dependent variable: p_i*)*					
Conjectural derivative	λ	-3.9052** (-2.38)	-4.4599*** (-2.70)	-3.4642*** (-2.63)	-3.1518*** (-2.70)
t	γ_1	-	-0.0009*** (-4.11)	-	-0.0017*** (-3.72)
Adj. R^2		0.6544	0.9776	0.9718	0.9564

t-statistics for the parameter estimates in parentheses (*** = significant at 1% level; ** = significant at 5% level; * = significant at 10% level)