

Measuring welfare loss of market power: an application to European banks*

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Abstract

From a model of imperfect competition among banking firms, the study derives an analytical expression that allows empirical quantification of the welfare loss associated with imperfect competition. Its application to the specific case of the European banking system shows that in spite of the process of deregulation, market power increased during the 1990s in 10 of the 15 countries of the EU. The welfare loss associated with market power represents close to 2.5% of EU GDP.

Key words: market power, welfare loss, banking

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1. Introduction

Over recent years the process of deregulation, along with the advancement of integration in the financial markets, has contributed to an increase in the level of competition in European banking. At the same time, the level of concentration in European banking markets has increased considerably as a consequence of the wave of M&As that has taken place, possibly counteracting the effects on competition of the deregulation.

This context of deregulation and increasing concentration has motivated the appearance of several papers whose aim is to offer empirical evidence related to the analysis of competition in the European banking markets. To this end, banking economics literature uses different tools to measure competition based on the industrial organization approach (Lerner index, conjectural variation models, Panzar and Rosse's H-statistic, etc.). Among the most recent are the papers by De Bandt and Davis (2000), Corvosier and Gropp (2002), Neven and Röller (1999), Bikker and Haaf (2002), Maudos and Fernandez de Guevara (2004) and Fernandez de Guevara, Maudos and Perez (2004).

Though all these studies offer evidence on the type of competition (perfect or monopolistic, etc.) and on the evolution of competition levels, none of them quantifies the loss of social welfare due to the existence of market power. This quantification is the objective of this study.

2. The measurement of social inefficiency of market power

In the case of banking firms, the model most often used to obtain a Lerner index expression is the Monti-Klein imperfect competition model¹. This model examines the behaviour of a monopolistic bank faced with a loan demand curve of negative slope $L(r_L)$ and a deposit supply of positive slope $D(r_D)$, the decision variables of the bank being L (volume of loans) and D (volume of deposits). For simplicity's sake the level of capital is assumed to be given and the bank is assumed to be price taker in the inter-bank market (r). As Freixas and Rochet (1997) show, this model can be interpreted as a model of imperfect competition (Cournot) among a finite number of banks (N). Cournot's equilibrium is the set of N vectors (D_n^*, L_n^*) $n=1, \dots, N$ which maximise the profit of bank n , considering the volume of deposits and loans of other banks to be given for each n . Thus, (D_n^*, L_n^*) is the solution of the following optimisation problem:

$$\max_{(D_n, L_n)} \left\{ (r_L(L_n + \sum_{m \neq n} L_m^*) - r)L_n + (r - r_D(D_n + \sum_{m \neq n} D_m^*))D_n - C(L, D) \right\} \quad (1)$$

In equilibrium, each bank sets $D_n^* = D^*/N$ and $L_n^* = L^*/N$. From the first order conditions, we obtain:

¹ Monti (1972) and Klein (1971).

$$\frac{[r_L^* - r - C'_L]}{r_L^*} = \frac{1}{Ne_L(r_L^*)} \quad \frac{[r - r_D^* - C'_D]}{r_D^*} = \frac{1}{Ne_D(r_D^*)} \quad (2)$$

where e_L and e_D are the elasticities of demand for loans and deposits respectively, and on the left hand side of each equations (2) appears the expression of the Lerner index for loans and deposits.

The relative margin (Lerner index) informs us about the level of competition in the market. As noted by Salas and Oroz (2003) the relative margin offers a proxy of the loss of social welfare due to the existence of market power. As figure 1 shows, assuming a linear loan (deposit) demand (supply) function and constant marginal cost, the loss of welfare (inefficiency) associated with imperfect competition (Harberger triangle) by unit of revenue ($r_L L$) –or unit of cost ($r_D D$) - is proportional to the Lerner index:

$$\frac{\Delta abc}{r_L^* L^*} = \frac{1}{2} \frac{r_L^* - r - C'_L}{r_L^*} \quad \frac{\Delta gih}{r_D^* D^*} = \frac{1}{2} \frac{r - r_D^* - C'_D}{r_D^*} \quad (3)$$

Additionally, the loss of consumer surplus relative to the perfect competition situation can be measured by the areas “ $abde$ ” and “ $fghj$ ” which we can quantify by unit of cost/revenue as follows:

$$\frac{abde}{r_L^* L^*} = \frac{r_L^* - r - C'_L}{r_L^*} \quad \frac{fghj}{r_D^* D^*} = \frac{r - r_D^* - C'_D}{r_D^*} \quad (4)$$

We can aggregate the consumer surplus loss plus the social inefficiency derived from imperfect competition, and express this welfare loss as a percentage of GDP as follows:

$$\frac{Welfare\ loss}{GDP} = \frac{3}{2} \left[\frac{r_L^* - r - C'_L}{r_L^*} \frac{r_L^* L^*}{GDP} + \frac{r - r_D^* - C'_D}{r_D^*} \frac{r_D^* D^*}{GDP} \right] \quad (5)$$

3. Empirical approach: an application to the European banking sectors

The empirical estimation of separate prices/rates for loans and deposits is not without problems. In the case of loans the public information contained in the profit and loss account does not give separately the financial income associated with them, as it appears jointly with other financial products. Likewise, in the case of deposits, the financial costs are included with those of other liability products.

For these reasons, in the empirical model of this study we use a single indicator of banking activity and, as in Shaffer (1993) and Berg and Kim (1994), banking output is proxied by the total assets (TA) of each firm. With this approximation, the average price of total assets is proxied by the ratio of total revenues (interest and non-interest income) to total assets. The welfare loss of market power as a percentage of GDP is calculated according to the following expression:

$$\frac{Welfare\ loss}{GDP} = \left[\frac{1}{2} \frac{r_{TA}^* - C'_{TA}}{r_{TA}^*} \frac{r_{TA}^* TA^*}{GDP} + \frac{r_{TA}^* - C'_{TA}}{r_{TA}^*} \frac{r_{TA}^* TA^*}{GDP} \right] = \frac{3}{2} \frac{(r_{TA}^* - C'_{TA}) r_{TA}^* TA^*}{GDP} \quad (6)$$

where r_{TA} is the average price of total assets (TA) and C'_{TA} are total marginal cost (both operating and financial). The calculation of total marginal costs is based on the specification of a translogarithmic cost function with one output (total assets) and three input prices (labour, capital and deposits)².

Data were obtained from Bankscope (Bureau Van Dijk). The sample consists of a total of 24,056 observations of non-consolidated banking firms during the period 1993-2000. The banking sectors analysed are those of the 15 countries of the European Union. TA are obtained from OECD and ECB and GDP from Eurostat³.

Table 1 shows the evolution of market power (Lerner index) and the loss of welfare associated with imperfect competition as a percentage of GDP . For the EU average, the Lerner index decreases until 1995, but just after that year it shows an increasing trend, reaching its highest value in 2000. By countries, market power has increased in ten of the fifteen integrating countries. The countries with more market power in the European Union (average of the period) are the United Kingdom, Finland, Denmark and Spain, whereas countries with lower Lerner indices are France, Belgium, Netherlands and Luxembourg.

In the case of the loss of welfare associated with imperfect competition, its evolution for the average of the EU increased after 1994 reaching a maximum of 2.5% of GDP in 2000. By countries, it is worth mentioning the high level of inefficiency of Luxembourg, not as a consequence of the low level of competition, but of the high weight of banking assets in relation to GDP .

4. Conclusions

From a model of imperfect competition among banking firms, the study derives an analytical expression that allows quantification of the welfare loss associated with imperfect competition. Its application to the specific case of the European banking system shows that in spite of the process of deregulation, market power increased during the 1990s in 10 of the 15 countries of the EU. Likewise, the welfare loss associated with market power increased from 1994 to a maximum of 2.5% of the EU GDP in 2000. Consequently, it is necessary to implement economic policy measures aimed at reducing the market power of banking firms.

² Observe that the estimated marginal cost approximates the sum of marginal financial costs (r in expression (5)) and marginal operating costs. The translog cost function has been estimated introducing both fixed effects and a trend variable to capture the effect of technical change. As usual, restrictions of symmetry and of degree one homogeneity in input prices have been imposed.

³ It has not been possible to obtain data on Total Assets for Ireland (1993-1994) and for Greece (1999-2000).

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Table 1. Lerner index and loss of welfare associated to market power

Percentages

a) Lerner index

	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	4.32	4.73	5.57	6.25	7.44	9.97	9.61	8.25
Denmark	12.07	16.66	12.72	13.17	13.89	10.45	13.89	11.28
Germany	11.32	13.33	12.79	12.67	11.08	10.63	8.97	9.19
Greece	2.48	4.29	4.73	5.59	9.72	9.50	17.10	15.60
Spain	12.24	10.15	10.14	9.64	12.50	14.66	16.20	15.74
France	7.70	5.52	4.68	5.34	6.08	5.91	8.53	7.87
Ireland	9.13	11.44	9.37	11.69	10.22	13.11	8.19	4.20
Italy	10.83	3.02	7.45	7.13	9.11	16.00	15.13	18.42
Luxembourg	8.72	7.13	6.95	8.34	8.09	9.12	7.48	6.46
Netherlands	6.56	8.81	5.85	5.13	9.99	9.42	7.14	6.86
Austria	7.81	8.23	9.10	10.48	11.24	12.09	8.24	11.02
Portugal	12.34	8.08	8.52	9.83	12.36	15.97	17.16	14.66
Finland	9.81	7.85	5.84	14.23	19.37	20.85	20.47	25.39
Sweden	14.62	12.74	15.60	16.84	13.71	12.82	5.54	8.18
United Kingdom	16.15	15.31	14.26	16.52	14.69	14.18	18.65	19.96
European Union	10.21	9.17	8.91	9.47	9.84	10.86	11.36	11.92

Source: BankScope (Bureau Van Dijk) and own elaboration.

b) Loss of welfare (inefficiency) associated with imperfect competition

Percentage over GDP

	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	1.60	1.51	1.72	1.77	2.12	2.90	2.57	2.38
Denmark	1.98	2.01	1.46	1.33	1.44	1.17	1.61	1.36
Germany	2.24	2.43	2.40	2.38	2.15	2.15	1.78	1.91
Greece	0.33	0.58	0.54	0.65	1.10	1.23	-	-
Spain	3.34	2.27	2.31	2.00	2.21	2.32	2.19	3.35
France	2.20	1.29	1.16	1.21	1.45	1.40	1.96	2.10
Ireland	-	-	1.65	1.97	2.38	3.24	1.69	1.60
Italy	2.56	0.57	1.53	1.39	1.55	2.41	1.77	2.59
Luxembourg	37.58	24.61	27.09	28.41	27.08	30.95	22.25	22.52
Netherlands	1.65	2.20	1.47	1.10	3.04	3.49	2.46	2.91
Austria	1.97	1.88	2.15	2.22	2.39	2.62	1.57	2.72
Portugal	3.95	2.34	2.21	2.22	2.74	3.51	3.44	3.83
Finland	1.88	1.08	0.62	1.46	1.84	1.99	1.71	2.34
Sweden	2.06	1.41	1.82	2.13	1.42	1.48	0.58	0.88
United Kingdom	2.23	1.93	1.78	2.21	1.91	2.08	2.42	2.73
European Union	2.37	1.82	1.86	1.88	1.93	2.17	2.08	2.51

Source: BankScope (Bureau Van Dijk), Bank Profitability (OECD), ECB, Eurostat and own elaboration.

Figure 1. Loss of welfare associated with market power

