The impact of deregulation on price and non-price competition in the Portuguese deposits market

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Abstract

The Portuguese deposits market experienced a pronounced deregulation phase from 1986 to 1992. During that period the situation moved from a highly regulated market in which Government-controlled institutions accounted for more than 90% of the market, to a complete integration into the fully liberalised European Internal Market. This paper studies the evolution of market power and non-price competition during that deregulation process. Using panel data, a system of three equations was estimated representing optimality decisions for deposit rates, advertising expenditures and branches. An important conclusion is that interest rate and entry deregulation were associated with an increase in both price and non-price competition. The small foreign-owned banks were found to have virtually no market power in deposits. On the other hand, although no direct relationship between market power and market share was found, significant market power was detected for the wholesale and banks that existed since before the Revolution. Thus, mergers between large banks are not likely to directly increase market power for the participating firms, although the association found between market power and concentration suggests that such mergers may increase the banking industry’s profits. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Portugal has a long tradition of administrative restrictions over banking activity. In 1975 all but three small foreign banks were nationalised. Until 1986, authorities set all deposit and lending interest rates. Entry in the market was simply banned by a Constitution that forbade the private ownership of banks. Opening of new branches depended upon the central bank’s authorisation. This institutional framework led to a situation of virtually no competition in the market.

In 1984, following approval of a Constitutional amendment, the regulatory framework was significantly changed. Banking was opened to the private sector and new institutions initiated activities in the market. Although permission for new banks was subject to a rationing process, more than ten new foreign banks established themselves in Portugal from 1985 to 1990 and four new Portuguese private banks were chartered in the same period. This may be compared to a total of 16 banks in existence in 1982. Table 1 provides year-end figures for the number of banks, branches, total banking advertising expenditures and the Herfindahl index for deposits in Portugal.

Because of the binding interest rate restrictions, the new banks chartered after 1984 opted to make a more affirmative use of non-price instruments in order to gain market share (MS), which in turn, triggered a similar reaction by the nationalised banks. Branch expansion was progressively liberalised and became the main competitive instrument during that period. Advertising expenditures were meaningless before the arrival of the new banks, but became increasingly important thereafter. Interest rate deregulation was progressively introduced, but the process reached completion only in the early 1990s.

<table>
<thead>
<tr>
<th>Year</th>
<th>Banks</th>
<th>Branches</th>
<th>Advertising</th>
<th>Herfindahl</th>
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<tr>
<td>1987</td>
<td>26</td>
<td>1546</td>
<td>453,327</td>
<td>0.121</td>
</tr>
<tr>
<td>1988</td>
<td>27</td>
<td>1598</td>
<td>982,435</td>
<td>0.117</td>
</tr>
<tr>
<td>1989</td>
<td>29</td>
<td>1747</td>
<td>1,800,146</td>
<td>0.113</td>
</tr>
<tr>
<td>1990</td>
<td>33</td>
<td>1982</td>
<td>3,531,308</td>
<td>0.116</td>
</tr>
<tr>
<td>1991</td>
<td>35</td>
<td>2496</td>
<td>5,992,897</td>
<td>0.104</td>
</tr>
<tr>
<td>1992</td>
<td>37</td>
<td>2840</td>
<td>6,246,365</td>
<td>0.111</td>
</tr>
<tr>
<td>1993</td>
<td>42</td>
<td>3110</td>
<td>4,199,918</td>
<td>0.111</td>
</tr>
<tr>
<td>1994</td>
<td>44</td>
<td>3548</td>
<td>6,537,915</td>
<td>0.112</td>
</tr>
<tr>
<td>1995</td>
<td>46</td>
<td>3729</td>
<td>7,059,595</td>
<td>0.091</td>
</tr>
</tbody>
</table>

*Total advertising expenditures at constant 1995 thousands of escudos.*
In 1989 the first privatisation of a nationalised bank took place, followed by another four privatisations between 1990 and 1993. As a consequence, the MS of deposits in the hands of Government-held institutions dropped from 90% in 1989 to 45% in 1993. This fall was due, on the one hand, to the transfer of bank ownership and, on the other, to the increased competition from the new private banks.

This deregulation process had an important impact on market concentration (see Table 1). As a matter of fact, some new institutions rapidly achieved MSs in excess of 4% at the expense of the existing institutions. ¹ Our aim is to evaluate the extent to which this deregulation process was associated with changes in pricing and non-price behaviour of Portuguese banking institutions. Thus, unlike most price concentration studies in banking, our purpose is not to make price–concentration comparisons between different local markets, but rather to evaluate the evolution of the price–concentration relationship in one specific market (country) over a five-year period.

A secondary purpose is to evaluate how banks’ market power is related to size, which is particularly important for merger policy. If higher market power is detected for the larger institutions, there will be gains from scale in the banking industry, even if the technology exhibits constant returns from scale. If this is the case, mergers will produce increased profitability for those involved, regardless of the structure of operational costs.

Given the above-mentioned evolution, the Portuguese case is interesting not only in and of itself, but also because it provides evidence of particular relevance for other economies also trying to evolve from a Government-controlled financial intermediation system to a fully market-driven environment. Its fast evolution from socialised banking to complete integration in the Single European Market is unique and constitutes an interesting case study on the effects of banking deregulation.

This paper concentrates on the market for deposits for several reasons. First, deregulation of the loan market was much slower than that of deposits, and for most of the period under analysis the Banco de Portugal administratively determined interest rates on loans as well as the maximum loan volume outstanding at each bank through credit ceilings. ² Second, competition for loans occurred only for corporate customers, since consumer credit was virtually non-existent while mortgage lending was restricted to three banks until

¹ For an analysis of the Portuguese deregulation process see Pinho (1996).
² Between 1979 and 1991 the Banco de Portugal controlled money supply through the imposition of credit ceilings. The total credit limit to the Portuguese economy was determined according to expected GNP growth, inflation and balance of payment targets and then that credit was distributed among individual banks according to a “secret formula”, in which time deposits and equity capital were “assumed” to have important weights. Banks exceeding their allocated ceilings (which seldom happened) could be severely punished.
the late 1980s, thus rendering the use of non-price competitive instruments relevant only for deposits. ³

The paper is organised as follows. Section 2 presents the theoretical background for the study. In Section 3 the econometric procedures and data employed are presented. Section 4 presents and discusses the empirical methodology and results. In Section 5 we present the main conclusions of the study.

2. Theoretical framework

2.1. Previous research

Several authors have tried to measure the impact of market structure on banking profits. The most popular approach is to regress a profitability index for banks or their interest rates on several market structure and other control variables. Generally, this approach has been employed for US data, where the main findings have been that highly concentrated local markets are more profitable for financial institutions. The most important references on this "reduced-form" literature are Berger (1995), Berger and Hannan (1989), Evanoff and Fortier (1988), Hannan and Liang (1995), Heggestad (1979), Heggestad and Mingo (1976) and Rhoades (1977, 1982). The early literature is analysed and surveyed in Gilbert (1984) and a more detailed survey is conducted in Weiss (1989).

More recently, many authors have preferred to abandon this reduced-form approach in favour of structural models based on the recent theory of industrial organisation ("new empirical IO"). Generally, these articles depart from a homogeneous product oligopoly model in which some assumptions are made in order to allow the estimation of some conduct parameters and/or their relationship with market structure. Examples of this approach are Berg and Kim (1994), Nathan and Neave (1989), Spiller and Favaro (1984) and Shaffer (1989, 1993). More recently, the differentiated product hypothesis has been introduced in this literature, along the lines of Hannan (1991), while Hannan and Liang (1993) and Heffernan (1993) provide examples of this approach.

The choice between these approaches is not an obvious one. The "new empirical IO" literature, although providing exact specifications for the price-concentration relationship, requires the imposition of an explicit functional form on the demand function, either explicitly as Berg and Kim (1994) and

³ From 1986 to 1992 the Government was very much concerned about the trade deficit. In order to minimise this problem it took severe measures to discourage private consumption, among them the elimination of consumer lending by banks and finance companies.
Shaffer (1993) or implicitly by assuming constant demand elasticities as Spiller and Favaro (1984). In most cases they also require the imposition of several symmetry assumptions. We are thus left with a dilemma on where to a priori impose a functional form: the price-concentration relationship or the demand function.

In this study, both price and non-price competitive variables are included. Heggestad and Mingo (1976) is the classical reference on this approach. However, while these authors estimate reduced-form equations in which interest rate and a few “service” proxies are used as dependent variables, our approach is based upon a structural model of the banking firm from which we derive optimal behaviour conditions for the use of three competitive instruments.

There are few empirical studies on the non-price behaviour of commercial banks. Exceptions, based on the “implicit interest” theory, are Startz (1983) and Heffernan (1992). A problem with some implicit interest literature is whether the two types of interest should be regarded as complementary or substitutes. For Whitesell (1992), a consequence of interest rate deregulation will be a reduction in the use of non-price instruments, but both types of interest (implicit and explicit) will persist thereafter. On the other hand, for Startz (1983) such deregulation will imply the complete elimination of “implicit” payments. Evidence for the UK from Heffernan (1992) seems to support the first view.

Empirical studies on advertising practices are scarce, which seems to result from the duopoly characteristic of most available structural theoretical models. Roberts and Samuelson (1988) made an important contribution to this literature and used a dynamic conjectural variation model to test for advertising competition in the US tobacco industry. Gasmi et al. (1992) used a more standard duopoly framework and estimated individual first-order conditions together with demand functions, making specific use of separately estimated cost function marginal costs, for the Pepsi/Coca-Cola duopoly.

The determinants and implications of branching location have received much greater attention from researchers than the overall use of branches as a competitive instrument. Examples of the first approach are Avery (1991) and Evanoff (1988), while Barros (1995, 1999) and Cabral and Majure (1993) provide applications to Portugal. The first author uses a spatial competition model to discuss the use of branching as a competitive instrument in the context of local markets, while Cabral and Majure (1993) tested whether branching should be seen as a strategic complement or substitute (to interest rates), concluding in favour of the first.

2.2. The model

In this paper, the differentiated product approach is followed. Basically, Hannan’s (1991) approach is extended to include a vector of non-price instruments and attention is focused on the market for deposits. An important
hypothesis that we make is that non-price instruments only affect the level of deposits. This is not entirely unrealistic if we consider the sample period that will be used for empirical work, since during most of that time banks’ total loans were subject to a binding ceiling and therefore banks’ non-price effort was directed toward attracting new depositors.

Banks are assumed to be price-takers in a competitive securities market and hold cash reserves equal to a fraction $\rho$ of total deposits. They compete for customer deposits, for which they face a continuously twice differentiable demand function $D_i(\mathbf{r}^D, r^S, \mathbf{V})$ where $\mathbf{r}^D$ is the vector of the average interest rates paid on deposits by all banks in the market, $r^S$ the interest rate on riskless securities and $\mathbf{V}$ is the non-price instrument matrix ($V_{i,j}$ means amount of non-price instrument $j$ offered by bank $i$), and for the $i$th bank we assume (for $k \neq i$) $\partial D_i / \partial r^D_i > 0$, $\partial D_i / \partial r^D_k \leq 0$, $\partial D_i / \partial V_{i,j} \geq 0$ and $\partial D_i / \partial V_{k,j} \leq 0$. Banks also hold customer loans ($L_i$). Real resources costs are given by a differentiable function $C(D_i, L_i, \mathbf{V})$, with $\partial C_i / \partial D_i > 0$, $\partial C_i / \partial L_i > 0$, $\partial C_i / \partial V_{i,j} > 0$.

The first-order conditions for this problem are

$$\frac{dP_i}{dr^D_i} = 0 \quad \text{and} \quad \frac{dP_i}{dV_{i,j}} = 0 \quad \text{for all} \quad j.$$  

The bank’s optimal non-price behaviour is characterised by

$$\frac{\partial P_i}{\partial V_{i,j}} = \left( r^S (1 - \rho) - r^D_i \right) \frac{\partial D_i}{\partial V_{i,j}} + \sum_{k \neq i} \frac{\partial D_i}{\partial V_{k,j}} \frac{dV_{k,j}}{dV_{i,j}} - \frac{\partial C_i}{\partial V_{i,j}} = 0.$$  

The term $dV_{k,j} / dV_{i,j}$ is generally designated by conjectural variations of firm $i$ relative to firm $k$, on the $j$th instrument. It may be interpreted as firm $i$’s beliefs in firm $k$’s reactions to $i$’s changes in the non-price instrument. It may also be interpreted as a measure of departure from Nash behaviour. A zero value will imply that firm $i$ completely ignores firm $k$ when making its non-price decisions (Nash behaviour) and a unit value means that firm $i$ believes that $k$ exactly matches its non-price decisions (perfect collusion). For each bank the perceived non-price elasticity will be

$$\varepsilon_{i,j} = \left( \frac{\partial D_i}{\partial V_{i,j}} + \sum_{k \neq i} \frac{\partial D_i}{\partial V_{k,j}} \frac{dV_{k,j}}{dV_{i,j}} \right) \frac{V_{i,j}}{D_i} \quad \text{for every} \quad j.$$  

And the optimal ratio of the non-price instrument $j$ relative to deposits is
\[
\frac{V_{i,j}}{D_i} = r^S(1 - \rho) - r^D_i - \frac{\partial C_i}{\partial D_i} \frac{e_{i,j}}{\partial V_{i,j}}.
\]

Eq. (5) above describes non-price competition behaviour for a given deposit interest rate. The amount of each non-price instrument \((V)\) will be proportional to the amount of deposits. That proportion depends upon the margin generated by each unit of deposits and marginal costs. Differences between banks will depend upon cost efficiency, demand characteristics and individual bank conduct. For deposit rates the optimal expression is given by

\[
\frac{\partial \Pi_i}{\partial r^D_i} = -D_i + \left( r^S(1 - \rho) - r^D_i - \frac{\partial C_i}{\partial D_i} \right) \left( \frac{\partial D_i}{\partial r^D_i} + \sum_{k \neq i} \frac{\partial D_k}{\partial r^D_k} \frac{dr^D_k}{dr^D_i} \right) = 0.
\]

Adopting a similar perceived elasticity concept \((e'_i)\) for deposit rates, the reduced-form solution for this system is given by

\[
r^D_i = \frac{e'_i}{1 + e'_i} \left( r^S(1 - \rho) - \frac{\partial C_i}{\partial D_i} \right),
\]

\[
\frac{V_{i,j}}{D_i} = \frac{e_{i,j}'}{1 + e'_i} \frac{r^S(1 - \rho) - \frac{\partial C_i}{\partial D_i}}{\partial V_{i,j}} \quad \text{for all } j.
\]

3. Empirical test

3.1. Empirical model

In this empirical test it will be assumed that, although authorities still set some deposit interest rates administratively, individual banks may have had the power, through client negotiations, to influence their customers to accept low-interest-earning deposit accounts. Thus, in this context, observed differences between average deposit rates across banks would reflect the banks’ power over their customers, the less powerful banks having to accept the need to pay higher interest rates.\(^4\) Thus, although some interest rate regulations were still

\(^4\) At the beginning of the sample period the time-deposits rate was set above its competitive value (to stimulate savings) and the demand-deposits rate was clearly below its optimum value (to avoid profitability problems caused by the other regulation). In most cases banks offered their customers some combination of both types of deposit or, for some customers, simply refused to accept time deposits. This bizarre regulation led, in practice, to a situation in which banks had some (although not totally free) capability to influence their average deposit rate but not the rates charged for individual products. Thus, the Portuguese situation was somewhat different than that of the USA at the time of the Regulation Q, which only imposed a ceiling on the deposit rate.
prevailing in 1988 and part of 1989, we shall handle the model as in the de-
regulated scenarios (7) and (8).

In order to estimate the determinants of margins in the market for deposits,
we follow Hannan and Liang (1993) and use the ratio between the interest rate
on deposits and its corresponding marginal return. Expression (7) may be re-
written as

\[
\frac{r^D_i}{r^S(1 - \rho) - \partial C_i / \partial D_i} = \frac{e^r_i}{1 + e^r_i}.
\]  

The right-hand side of Eq. (9) is an indicator of the bank’s pricing policy
and depends on the elasticity of demand as perceived by the bank (the analogue
for the deposit rate of expression (4). A value of one means that the bank
passes all of its marginal return to depositors (competitive outcome). There-
fore, this measure is a ratio, which may be used to evaluate market power
whenever price is the only competitive weapon: the lower its value, the higher
will be the bank’s power exercised over its customers.

In Hannan (1991) the perceived elasticity \( e^r \) is related to the firm’s MS and
market concentration. That author assumes that concentration has a positive
influence on the individual bank’s conjectures (and degree of collusion), while
MS has a negative influence on the individual firm’s demand elasticities (and
individual bank market power). Unfortunately, Hannan (1991) paper, al-
though providing a theoretical rationale for the relationship between prices and
these variables, results in highly non-linear reduced forms with non-identifiable
parameters. Therefore, previous empirical applications of that model assumed
either a linear or quadratic relationship between numerator and denominator
on the left-hand side of Eq. (9).  

Given the above considerations, we shall conduct a test to determine which
variables influence the firm’s pricing conduct in the market. Following Hannan
(1991), the most important explanatory variables for this test are the Herfin-
dahl market concentration index (CR) and MS. Some control variables were
added in order to account for firm differences associated with ownership and
strategy. Those dummy variables were defined as AGE (= 1 for “banks op-
erating before 1974”), PUB (= 1 for “Government-owned”), FOR (= 1 for
“foreign-owned”), PRIVR (for “privately-owned retail banks”) and WHO
(= 1 for “wholesale banks”). To simplify the econometrics of this test, a linear
relationship was assumed, with the justification that it may be valid for devi-
ations around some central point. Attempts to estimate non-linear relation-
ships failed to provide better econometric results and in some cases experienced
convergence difficulties. Eq. (9) is estimated in the following reduced-form:

\[5 \text{ Hannan and Liang (1993) assumed a quadratic relationship while in Hannan and Liang (1995) a simple linear regression between interest rates and the explanatory variables is employed.}\]
\[
\left( \frac{r^D}{r^S(1 - \rho) - \partial C / \partial D} \right)_{i,t} = \mu_C CR_{i,t} + \mu_S MS_{i,t} + \mu_X^T X_{i,t} + u_{i,t},
\]

(10)

where \( \mu_C, \mu_S \) and the vector \( \mu_X \) are the parameters to be estimated, \( X \) is the vector of control dummy variables and \( u \) is the usual white-noise econometric residual.

For non-price competition, two different variables were considered: advertising and branching. For simplicity, the goodwill effect of advertising expenditures (ADV) is ignored, and thus a Dorfman and Steiner (1954) type solution is employed. The banks’ cost function is additive on advertising expenditures, thus \( \partial C / \partial A V D = 1 \). Banks’ advertising policy may be characterised as

\[
ADV_{i,t}/D_i = \frac{\epsilon_i^{ADV}}{1 + \epsilon_i^{ADV}}.
\]

(11)

The right-hand side of expression (11) above characterises a bank’s advertising effort, where it is assumed that this is related to market structure, bank’s MS and other variables as above. Some banks have exceptionally high advertising expenditures in the year of their privatisation and that effect must therefore be discarded using a dummy variable (PR = 1 if the bank is being privatised that year). The explanation for this high expenditures is associated with the promotion of the bank’s image required to help the IPO. Consistent with the assumptions made for the interest rate on deposits, the equation to be estimated is

\[
ADV_{i,t} = p \times PR_{i,t} + (\gamma_C CR_{i,t} + \gamma_S MS_{i,t} + \gamma_X^T X_{i,t}) \times (r^S(1 - \rho) - \partial C / \partial D)_{i,t} D_{i,t} + v_{i,t},
\]

(12)

where, as with Eq. (10), the \( \gamma \)'s represent parameters to be estimated and \( v \) is the usual white-noise econometric residual.

For the number of branches \( (B) \), writing the analogue of expression (11) is straightforward, the main difference between both expressions being the presence of the marginal cost of the non-price instrument below:

\[
B_i / D_i = \frac{\epsilon_i^B}{1 + \epsilon_i^B}.
\]

(13)

The total number of branches is a stock variable. In order to open a new branch, a bank has to consider the required investment against expected present value of future cash flows. Thus, a non-permanent drop in a bank’s margin will not necessarily imply the closure of some branches, since their expected future profits may compensate short-run losses. This, associated with the very slow branching deregulation process and the adjustment difficulties found by Cabral and Majure (1993), make the use of a partial adjustment process advisable:
\[ B_t - B_{t-1} = \lambda (B^*_t - B_{t-1}) , \] (14)

where \( B \) stands for the actual number of the bank’s branches and \( B^* \) their desired value, obtained through the optimality condition (8), for \( V = B^* \). Replacing it in Eq. (14) and considering the same conduct and market power determinants, we obtain

\[
B_{i,t} = \frac{\lambda}{(\partial C/\partial B)_{i,t}} \left( \beta_C CR_{i,t} + \beta_S MS_{i,t} + \beta_X X_{i,t} \right) m_{i,t} D_{i,t} + (1 - \lambda) B_{i,t-1} + w_{i,t},
\]

(15)

where \( m_{i,t} = (r_S(1 - \rho) - \partial C/\partial D)_{i,t} \), the \( \beta \)'s are parameters to be estimated and \( w \) is a white-noise residual. Eqs. (10), (12) and (15) constitute the system of equations to be estimated.

3.2. Data

Our main purpose is to evaluate the association between competitive behaviour and market concentration. Since the deregulation process has simultaneously affected both, we may not infer that any association between them should be regarded as causality, in either direction. In order to evaluate the association between banks’ competitive conduct and this reduction on market concentration, a pool of 23 banks, representing more than 95% of the market, for the years 1988–1992 was constructed. This corresponds to the period during which deposit market deregulation decisions were progressively introduced. Balance sheet and income statement variables were obtained from the Associação Portuguesa de Bancos bulletins, figures on branches were obtained from those bulletins and from the Banco de Portugal. Estimates from Sabatina (a marketing research institute) were the source of advertising data. All money-denominated variables were deflated for 1986 prices.

Data on interest rates on time and demand deposits at the individual bank level are not available, leading to the need to work with a yearly average deposit rate for each bank. This average is computed by dividing total interest costs by the sum of deposits and purchased funds. Unlike the situation in the US and other markets, the latter has little relevance on the funding of Portuguese banks which, in this period, suffered from excessive liquidity due to the low amounts of credit that resulted from the imposition of credit ceilings.
kets for deposits, it is impossible to overcome with the available data. However, since we are more interested in the evolution of the rates than in their absolute level, this should not have a significant impact on our findings. Descriptive statistics of the data follow in Tables 2 and 3.

Marginal return on deposits was computed as the yearly average of monthly money market rates published by the Banco de Portugal multiplied by a factor which adjusts for the cost associated with non-earning and below-market rate cash reserves. The real resources marginal cost for deposits and branches was obtained from the estimates of a stochastic cost frontier for Portuguese banks (1987–1992). Plant-size marginal costs were used since these represent the short-run costs.

Deposits were defined as the sum of time and demand deposits together with certificates of deposit and treasury bills sold under repurchase agreements. MSs on deposits were constructed assuming the relevant universe to be the banks listed by the Associação Portuguesa de Bancos.

4. Estimation and results

4.1. Estimation procedure

The system of non-linear equations (10), (12) and (15) is estimated using the full information maximum likelihood technique (FIML). Using TSP’s FIML estimates as a starting point, an additional iteration is performed to obtain White’ (1980) robust estimates for the variance-covariance matrix of the parameters. This last feature is particularly important given that the panel structure of the data may lead to heteroscedasticity problems.

The three equations are estimated simultaneously since they result from the same set of first-order conditions and, therefore, there is a high likelihood that some contemporaneous covariance may exist between their residuals. In this context, OLS estimators are biased and inconsistent. We believe that the proposed procedure has an advantage over the single equation approach to market power on deposits (10), given the obvious interaction that must exist between explicit pricing (rate) of banking products and their corresponding promotion (advertising) and distribution (branching). To put it concisely, the entire “marketing mix” must be handled together.

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8 Pinho (1994, Chapter 1).
9 This concept was introduced by Benston et al. (1982) and represents the cost of an additional unit of deposits by holding constant the total number of branches. Computations are provided in Pinho (1994).
4.2. Results

Estimates for the system of equations (10)–(15) follow in Table 4. In two equations the Herfindahl index has an associated significant negative coefficient, meaning that the fall in market concentration was accompanied by a more aggressive price and advertising behaviour among Portuguese banks, while branching policy seems to have been less sensitive to that variable. To test the robustness of this conclusion, the concentration variable was replaced by a time trend, which was significant for the first equation only. Thus, the effect captured by the Herfindahl index goes beyond a mere trend, although some collinearity exists between the two variables. Therefore, these results indicate that both structure and conduct in the market have moved in the expected way.

Table 2
Summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
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<td>1.191</td>
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<td>0.033</td>
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<td>1.000</td>
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Table 3
Correlation matrixa

<table>
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aMRD, ADVM and BRM are the left-hand sides of Eqs. (10), (11) and (13), respectively.
A quadratic generalisation of Eqs. (10), (12) and (15) was also estimated, and it was concluded that the coefficients associated with most quadratic terms were not statistically significant. Therefore, in this article we only provide results for the linear version of the model.

For the interest rate equation, the negative relationship between the dependent variable and market concentration indicates that deregulation was associated with a more competitive conduct on the interest rate instrument. This effect very likely results from a more aggressive behaviour on the part of the banks in this market. In other words, reduction in concentration may be

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<th>Std error</th>
<th>T stat</th>
<th>Significance</th>
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*The significance level of the estimated parameters is represented by * (95%), ** (98%) and *** (99%) for two-tailed tests.
associated with less cooperative behaviour by the major players, leading to an increase in their “perceived” elasticities and, consequently, to lower margins on deposits. \(^{10}\)

Also interesting in this context is an analysis of the evolution of the estimated values for the right-hand side of Eqs. (9), (11) and (13). For all banks, as a result of the assumption of symmetry in reactions to concentration, these indicators rise over time, indicating an increased competitiveness in this market. As in Hannan and Liang (1993), the estimated value of the right-hand side of (9) may be used to test the hypothesis that its “true” value is one, i.e. that the bank sets the prices of deposits equal to their marginal revenue (competitive outcome). For 1988 this hypothesis is not rejected in the case of only one bank in the sample. With the decrease in concentration, in 1992 a situation is reached in which four firms were estimated to be practising marginal cost pricing of deposits and, surprisingly, another five would be paying interest on deposits exceeding their marginal return. Most of the latter are foreign-owned and very small.

Although this last finding seems somewhat difficult to understand, it may, in fact, result from three (not mutually exclusive) different causes. One is that the implementation of dynamic pricing strategies may result in such behaviour for small banks trying to grow quickly and explore economies of scale or other size-effects. \(^{11}\) Of course, this would represent a temporary disequilibrium under the context of the present model. \(^{12}\) Another is that it may result from some myopia in the evaluation of real resources marginal costs involved in servicing deposits. The final possible cause is associated with cross-subsidisation of banking products, i.e., losses in deposits being compensated by the profitability of other products being sold to the deposit customers.

The relationship between market concentration and the two non-price instruments is different. In the case of advertising, the strong increase in expenditures is explained, at least partially, by the increased competitiveness of the market. However, the growing number of bank branches during the sample period must be justified by the above-mentioned estimated slow adjustment

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\(^{10}\) See Hannan (1991, pp. 70–75) for a theoretical explanation in the present paper’s context.

\(^{11}\) Given the anecdotal evidence on switching costs in this market, a possible theoretical explanation for this pricing policy is the one provided by Klemperer (1987). This author shows that the existence of customer switching costs provides incumbents with significant market power and may induce entrants to price their products more aggressively than do existing firms.

\(^{12}\) The new entrants’ behaviour would probably be more adequately described by a dynamic model on which they choose their desired size but, because of switching costs, that takes some time to be achieved and requires aggressive pricing strategies. Such a situation would be regarded in the context of the present model as a disequilibrium result. However, given the small number of institutions which fall into this category, we preferred to keep our model as it is and leave for future research the study of this particular situation.
speed, as well as the impact of the change in ownership structure resulting from privatisations. This last effect is detected via the significant negative coefficient of the variable PUB in the branching equation and is strongly corroborated by the findings in Barros (1995).

The relationship between the interest rate price–cost margin (9) and MS is more difficult to interpret. Results show a positive non-significant coefficient between the two. This could be an indication that the two variables are not related. However, most banks with MSs above 5% are classified “old”, a factor that is found to be positively associated with market power. In this context it is interesting to verify that market power estimates for privatised banks allow the rejection of the hypothesis of marginal return pricing of deposits in the years following privatisation. 13 Thus, we may conclude that, regardless of ownership, the “old bank effect” is clearly an important factor in the determination of market power, which may be associated with a stable customer base.

There is also a large positive coefficient associated with the FOR dummy variable. This may be interpreted as an indication that foreign banks have a strong disadvantage in this market, since that parameter’s estimate indicates that they have to pay in interest costs 25% more of their marginal return than do their (larger) local competitors. All of these foreign banks have MSs below 2%. It is also found for all large banks that the marginal cost pricing hypothesis is rejected, with the exception of one single private institution in 1992.

For advertising, the estimated relationship with MS is interesting. We detect a negative relationship between the two variables, which seems to indicate that large banks are able to spend less on advertising per deposited escudo than the small institutions. Another statistically significant dummy variable is AGE, which indicates that, as expected under a Nerlove and Arrow (1962) or other dynamic context, new banks advertise more than the older ones in order to build “goodwill”. Another explanation is that there could exist economies of scale in advertising, thus allowing large banks to spend relatively less in the promotion of their products.

Wholesale banks probably benefit from the relationship with large corporations, which allows for a small advertising effort. The inverse situation seems to prevail for the privately owned retail institutions. We found that in 1992, large commercial banks spent between 0.1% and 0.2% of their margin on advertising, while the pattern for banks in the 2–4% market-share range was irregular.

It is also interesting to note that the dummy variable PR is statistically significant, meaning that banks increase their advertising expenditures during the year of their privatisation in order to contribute to the sale of the shares (about 105 million escudos at 1986 prices).

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13 Estimates for individual banks are available from the author upon request.
Branching effort, i.e. the number of branches per escudo of margin on deposits, is negatively related to MS and does not seem to be associated with market concentration. The high coefficient associated with MS is an indication that larger banks are able to serve their customers with a relatively lower branching effort. For the largest banks this is clearly an advantage, one which may result from competitive conduct (lower “implicit interest”) or the direct result of network externalities (customers may prefer larger networks). This behaviour is also compatible with a dynamic non-price model and with previous findings on the productivity of bank branches.\textsuperscript{14} The first explanation is also corroborated by the statistically significant negative parameter associated with dummy variable AGE, which shows that older banks spend a significantly lower portion of their margin on branching than do the new institutions.

Also interesting is the finding that Government-owned banks make a lower branching effort than do the private ones (variable PUB). If we combine this finding with the significant coefficient associated with dummy variable AGE, we are led to the conclusion that privatised banks increased their branching effort after privatisation.\textsuperscript{15}

The partial adjustment speed ($\lambda$) is very slow in this estimation (0.14). This may be an indication that banks take some time to react to new-environment conditions as a result of the entry and exit costs involved in the implementation of banking offices.

5. Conclusions

In order to study the impact of deregulation on price and non-price competition in the Portuguese deposits market a system of reduced-form equations, based on Hannan (1991) oligopoly model of the banking firm, was estimated for the deregulation period of 1988–1992. Among the major conclusions that are obtained from the present study is the fact that during that period the market concentration fell while competitiveness increased. This results from a strong association between both price and advertising competition intensity and market concentration. In other words, the fall in concentration was accompanied by an increased rivalry, which resulted in lower market power for banks. Also important is the finding that while the combined effects of deregulation and reduced concentration had a significant and positive impact on the use of advertising as a competitive instrument, no such effect was detected for branching expansion.

\textsuperscript{14} Pinho (1994, Chapter 1).
\textsuperscript{15} The reader should note that the observations that are classified as “old” and not “public” are all relative to privatised or foreign-owned institutions.
Another finding is that most small banks have a notorious disadvantage relative to the larger ones: they have to pay higher interest rates, together with higher advertising and branch expenditures per each escudo of margin generated by deposits. The only exception to this rule occurs among the small wholesale banks, in which such a non-price disadvantage is less pronounced.

Regarding the analysis of potential effects of bank mergers, results do not provide evidence for a positive effect of size on market power. However, since some price–concentration relationship was found, mergers between large banks should be evaluated with care, since the resulting increase in concentration may lead to higher market power in the industry.

Also important to note is that a small number of new foreign-owned institutions find themselves in an especially difficult situation, paying interest rates that may exceed their marginal return, added to the need to carry the highest non-price costs. This behaviour, however, may be easily justifiable under a dynamic adjustment process for banks trying to achieve a high MS, and therefore has to be seen as an investment cost that is associated with a growth process.

Found to be on the comfortable side were the “top 10” banks, made up of old institutions, which were (all but one) Government-owned in 1988, some of them privatised during the period. They seem to benefit from significant market power on deposits and to be able to keep their customer base with lower advertising and branching expenditures than their smaller competitors can. For the privatised institutions, an increase in new branch creation was detected, while the other dependent variables in the study seem to have remained unaffected by the change of ownership.

We found that the Portuguese market for deposits became increasingly competitive during its deregulation process. While for the larger institutions a non-perfectly competitive behaviour is found, an inverse situation is found for the smaller institutions. For the latter, high competitiveness drove some institutions to a highly aggressive stance, with deposit interest rates set above their marginal return and very high ratios of advertising and branches relative to the margins generated by deposits.

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References


