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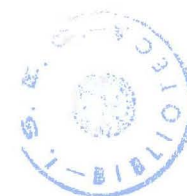
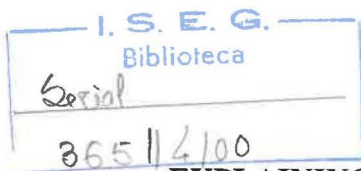
**EXPLAINING STRATEGIC
PERFORMANCE IN THE
PORTUGUESE FINANCIAL
SERVICES INDUSTRY**

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EXPLAINING STRATEGIC PERFORMANCE IN THE PORTUGUESE FINANCIAL SERVICES INDUSTRY

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Abstract

This paper aims to identify some economic and financial variables that evaluate the goodness of the strategic choices undertaken in a small economy, when most of the companies are not listed and equity prices are not available. We used the strategic decisions taken by the Portuguese financial services industry (banks and insurance companies). Based on a questionnaire that was sent to all of the Portuguese financial firms, we were able to apply factor analysis to the results to determine two major factors (business environment and strategic choices) to explain corporate performance. When strategic choices were decomposed into several explanatory sub-variables we found technology adoption, strategic alliances, geographic based strategies and attention focused on competitive aspects as the main contributors. This conclusion is observable when traditional regression analysis methodology is used as well as when neural networks were built. Our methodology applied to Portuguese data provided findings that support previous research in more developed economies where studies were carried out with market prices data extracted from efficient capital markets.

Key words: Strategic performance, financial services, banking industry, insurance industry, neural network analysis, Portugal.

1. Introduction

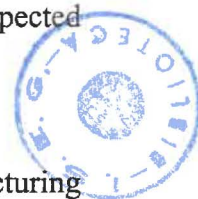
During the last decade, the Portuguese financial services industry has been under an enormous change, as a result of successive challenges. These defy pushed banks and

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insurance companies to assume some important strategic decisions that they expected to drive them to a brighter future.



Both banks and insurance companies have been subject to a deep restructuring process as a result of a market liberalization, a privatization program and a concentration process that have occurred simultaneously⁴. During the Eighties, as a direct consequence of the European integration process, both industries suffered a fast change in commercial terms. Particularly, the banking sector suffered the opening of both the interest rate and the exchange rate market to foreign participants. As a consequence, direct competition to conquest the internal market share increased and the concentration program through several acquisitions begun. Large banks launched several tender offers over other small banks or insurance companies.

In a parallel process, the government launched a privatization program which begun by the financial sector, particularly the banking activity. Curiously, the privatization program has strengthened the concentration process. Since then, in every privatization, a significant share of the equity capital was sold by direct negotiation to a particular investor. Such investor was typically a former owner of the company before the nationalization process that occurred during the mid-Seventies, or another bank / insurance company able to provide the knowledge of the business. As a consequence, three big financial groups nowadays compose the Portuguese financial industry, each one owning one or more insurance companies.

Meanwhile, these firms have taken several important strategic decisions, in order to survive to such a restructuring wave and to be well placed to succeed once the European integration process is ended.

We are particularly interested on evaluating the performance of some recent strategic decisions undertaken by the Portuguese financial services firms. Strategic performance should be reflected on equity prices traded in stock markets, at least in the long run. Several papers have been documenting relations between strategic decisions and their perceived value by shareholders. However, when markets are

⁴ See among others Cabral and Majure [1993], Barros [1995], Pinho [1996], Nunes and Montanheiro [1997], Barros [1999], and Pinho [1999].

thin, and when the majority of the firms under scope are nonpublic unlisted companies, that is, companies not traded in the financial markets, we face a further challenge. This challenge is increased when we observe a small economy with a small number of financial institutions. We wonder if in such circumstances we still observe consistent indicators for measuring the goodness for strategic decisions.



This paper, continuing the work published in Gonçalves, Palma-dos-Reis and Duque [1997], aims to identify some economic and financial variables to evaluate the goodness of the strategic choices undertaken in a small economy, when most of the companies are not listed and equity prices are not available. We used the strategic decisions taken by the Portuguese financial services industry (banks and insurance companies) in order to prepare for the integration in the European financial market to ascertain the effects of strategy on performance, for which we found no previous studies.

In order to address these issues, we review the literature on the strategic performance analysis in section 2. Afterwards, we present the methodology followed and the data collected in section 3. The empirical evidences are derived in section 4 and the conclusions are presented in section 5.

2. Theoretical Considerations on Strategic Decisions, Business Environment and Performance

In the literature we find two main causes for different levels of strategic performance: the business environment and the strategic decisions undertaken. Although the environment may itself push firms' performance independently from its government process, the managerial process governing corporations should result on strategic decisions leading to an increasingly market performance. This dependence link has been suggested and empirically supported by Miller and Friesen [1983], Venkatraman and Prescott [1990] and Tan and Litschert [1994] for large-scale economies of developed countries or developing countries in centrally planned economies. We have no preemptive reason to suspect that small economies will react differently and, therefore, it is reasonable to expect profitability and growth as the result of both business environment and strategic decisions undertaken. Kotha and Nair [1995] also

found that for the Japanese machine tool industry, both environment and strategic decisions seem to play significant roles on the firm-level performance. However, other authors (see Grinyer et al. [1980]) seem to find the environment as a stronger explanatory variable for firms' performance. In terms of strategic decisions, several strategies can be implemented in order to obtain better results towards shareholders wealth.

In this paper, we are concerned with the association between environment conditions and chosen strategies, but we are also concerned whether different strategic choices have played a significant role on the economic and financial performance of the financial industry.

For empirical purpose we selected technological development, strategic alliances, geographic based strategies and the development of competitive aspects as the main components or areas of strategic decisions playing a major role for explaining financial industry performance. The basis for this selection and its theoretical model derives from the existing literature.

Although technology adoption should not be the sole responsible for successful performance, as noted by More [1987], its positive impact on profitability has been widely demonstrated in the literature. Theoretically, capital investment on technology helps to increase efficiency, cost reduction, product delivery gains and consequently, it should represent a positive impact on profitability. Lusch, Zizzo and Kenderdine [1993] found technology adoption to be an important contributor for financial performance in US wholesale market. Kotha and Nair [1995] found that technological changes, as a result of capital expenditures, are positively related to profitability in the Japanese machine tool industry. Raymond et al. [1996] found technological changes as a determinant cause for performance, if not a survival factor, for small and medium-sized firms in the manufacturing sector in Canada. When cross-examining the sector, Majundar [1995] found a weak positive relation on technology adoption by the US telecommunications industry and performance. But a stronger and positive pattern was observed when examining performance over time. MacPherson [1994] examining a sample of small industrial firms belonging to 6 different sectors, found a positive relation between new technology adoption and growth, value-added and total

sales. As financial services are becoming increasingly technological dependent and as theoretical models and empirical results show, we should expect technology to have a positive impact on the financial industry performance.

Development of strategic alliances is another strategic orientation well documented in the literature to face shareholders demand for wealth growth. Theoretically, strategic alliances occur whenever companies realize that they lack resources to compete alone in the global market. If alliances are developed we would expect a superior performance of allied companies in global and competitive markets. Luo [1996] showed that Chinese firms involved with international strategic alliances outperformed domestic firms in terms of efficiency, and outperform wholly owned subsidiaries in terms of market growth, although presenting higher financial risk of liquidity and solvency. Reijnders and Verhallen [1996] document the Netherlands case of strategic alliances between retailers, showing that membership in a strategic alliance had a positive effect on the performance. Allied retailers performed better, showing a more professional and active market approach, as well as higher profits. However, Glaister [1996] has proved that performance in strategic alliances is considerably influenced by the nature of the chosen partner. Then, partner selection becomes a major issue for successful strategic alliances. This idea was corroborated by Harrigan [1988] who stated that the success of ventures is not independent from the type of partner chosen. It seems that alliances are more successful if partners are related to their ventures or horizontally related to them than when they are vertically related or unrelated to their ventures. Parkhe [1993] also shows how structure in inter-firm alliances plays an important role on the level of performance obtained by the venture. Gray and Yan [1992] developed a model showing the evolutionary process of a venture and providing a clear cut between domestic and international joint ventures. Therefore, although strategic alliances can be more successful when partnership is carefully considered, we expect positive impacts of strategic alliances on market performance, as theoretically developed and was empirically documented in the literature.

Geographic-based strategies may also have a significant impact on performance. Theoretically, the rationale for such expectation is based on the assumptions that geographic expansion can lead firms to increase sales, to reduce fixed costs and to

increase profitability. Douglas and Craig [1983] summarized the traditional business philosophy that associates market share and profit measured by return on investment (ROI), and present empirical evidence in USA, Europe and other markets for the positive relation between market share and return on investment (ROI). However, although this effect has been detected in all the markets, it shows different magnitudes across them.

Sometimes, geographic and product diversification are related as presented in Hitt et al. [1994]. However, as they also noted, geographic diversification, specially moving abroad, is commonly positively related with performance. Although more recently technology has been playing an increasing importance on financial retailing, replacing the traditional quality of geographic location for retail financial services success, it has been a common factor for performance improvement, as Tandy and Stovel [1989] document for USA and Canada. However, some authors contest previous findings and show, as Grinyer et al. [1980] that, for a sample of 48 large UK firms, there is little relation between the link of strategies and structure (namely geographically based) and financial performance.

We also found in the theoretical literature some attention given to competitive aspects as a plausible variable for performance justification. The theoretical framework relies on the assumption that a more competitive orientation perspective will lead firms for developing more effective detection systems of environmental changes, for inducing product development or quality oriented decision making. Such an effort will guide firms to increase performance. This model, although naïve, as called by Barnett et al. [1994], seems plausible in interpreting, for instance, the positive performance of Peruvian firms or when used by Oral and Singer [1992] for modeling decision support systems for strategic choices.

In summary we found a theoretical framework for performance explanation based on favorable environment conditions and on appropriate strategic decisions. We selected both variables as possible explanations for performance but we also went further in strategic decomposition, allowing strategy to be segmented in several explanatory sub-variables, such as technology adoption, strategic alliances, geographic based strategies and attention focused on competitive aspects. We found that theoretically

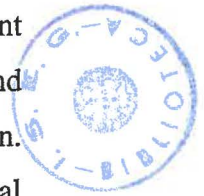
and empirically, technology adoption, strategic alliances (although with some reserves), geographical expansion and focus on competing aspects are positively related to performance, as summarized by the following equation:

$$\text{Performance} = f \left(\begin{array}{l} \text{Business Environment;} \\ \text{Technology Adoption;} \\ \text{Strategic Alliances;} \\ \text{Geographic Based Decisions;} \\ \text{Competitive Aspects} \end{array} \right)$$

The analysis of the impact of corporate strategic choices on corporate performance is not a straight and simple task. The analysis can differ according to the perspective of the researcher and the interest that is stressed. We may focus on the shareholders wealth perspective, on the management interest perspective, or on the remaining stakeholders' point of view. Such diversity, well established in the literature after the Jensen and Meckling [1976] seminal paper on the agency theory, can result on different conclusions. The criteria used to access corporate performance depend on the analysts' perspective and are not uniform. For instance, corporate managers commonly stress the reduction of economic inefficiencies to justify corporate mergers and acquisitions. If these strategic steps are developed on unquoted companies, it becomes rather difficult to confirm, on the mid-term, the reasons given by managers. However, if corporate mergers and acquisitions effectively reduce economic inefficiencies in the long run, we should conclude it consistently, no matter which perspective or data source is used. But, whenever financial markets are emerging, or when it is difficult to access nonpublic information, research generalization becomes seriously dependent on methodology. In such cases, cross analysis becomes a strong methodological instrument because it enlarges the basis of the research and the sample size, and has been frequently used in the literature.

All we have been stating turns evident in the literature on the topic. Strategic decisions can be evaluated through an internal perspective or based on an external standpoint. Firms normally adopt the internal approach when evaluating the performance of their strategies. Such approach is based on the regular monitoring and controlling of strategic performance by comparing it with strategic objectives.

McNair and Mosconi [1987] support that organization's performance measurement systems should be based on four critical success factors (people, quality, delivery and cost), but they do not exclude other multiple characteristics of the organization. Jacobs and Kleiner [1995] propose criteria such as environmental awareness, ethical conduct, citizenship and employee relations.



However, the difficulty of the internal perspective when analyzing corporate strategic performance relates to the secrecy of data and to the privacy of the accounting systems. This turns stakeholders' evaluation difficult or even impossible.

Alternatively, market or public data can be used to assess performance of strategic decisions. Chakravarthy[1986], Mehra [1996] and Banker, Chang and Majundar [1996] use accounting and market data to evaluate performance of strategic decisions on the computer industry, telecommunications industry and banking industry, all in the US. In such process, Schmid [1987], Schmidt [1992] and Banker, Chang and Majundar [1996] support benchmarking as a way of comparing companies' performance.

Simple measures of performance, like the return on investment (ROI), although simple to compute and extensively used, have some shortcomings that deeper analysis should overcome. Norburn and Miller [1981] underline that return on investment, the most common performance measure for corporate managers, tends to concentrate them on short-term results while long term corporate goals are less likely achieved. Krasts [1981] also advises that traditional financial statement analysis measuring income based on historical costs is misleading, but the use of cash flows can improve performance analysis.

As a result, there is a general consensus on the fact that superior performance analysis is obtained when a broad source of data and variables are used. Dess and Robinson [1984] suggest subjective measures in addition to accounting measures. Chakravarthy [1986] proposes the firm's ability to satisfy all of its stakeholders or the quality of the transformation process. Using the corporate reputation for each of the stakeholders, Chakravarthy [1986] uses a likert scale to rank the quality of management, the value as a long-term investment, the financial soundness, the use of corporate assets, the

quality of products and innovativeness, the ability to attract, develop and keep talented employees, and the community and environmental responsibility. Doyle [1994] emphasizes that traditional measures such as profitability or market share are not enough, so innovation or stakeholders' value should be stressed. Burchman and Schneier [1989] also support the idea that several sources of variables should be used for assessing CEO's performance.

To overcome the shortcuts of money based measures for performance evaluation time-based measures have been suggested (see Stalk and Hout [1990] and Spanner, Nuno and Chandra [1993]).

Even when market prices are unavailable, risk has been measured based on accounting variables. Ruefli et al. [1999] presents an extensive list of risk measures based on accounting variables.

In summary, the literature generally concludes that research on corporate strategic performance should be preferably based on different data sources whenever available. However, when financial markets are not sufficiently established and internal information data is not available, research has frequently overcome such deficit by using partial data, extending cross analysis and improving sampling significance. Furthermore, accounting measures won't change the general conclusions for accessing long-term performance.

3. Data and Research Design

The data was collected by administering a questionnaire (see Appendix attached) to all banks and insurance companies based or in activity in Portugal in December 1995. In February of 1996 it was done a follow up of the questionnaire, by telephone, in order to increase the rate of success, measured in terms of the number of the answers to the questionnaire. From a total of 118 questionnaires sent (73 to insurance companies and 45 to banks) we got 18 answers from insurance companies and 14 from the banks. Although the number of returned questionnaires was moderate, this sample represents 40% of the total Portuguese insurance industry and 60% of the total Portuguese banking industry. Table 1 expresses the Total Assets and Total Turnover

for the sample and for each of the industries. From Table 1 we conclude that the Portuguese banking industry is clearly larger than the Portuguese insurance industry. Fortunately, the sample is more significant for the former than for the latter industry. This turns out, in aggregated terms, a representative sample of almost 60% of the banking and insurance industry.

[Table 1 Here]

In order to measure the performance of these companies, we developed a three-step methodology: first we applied factor analysis to the database built with the answers to the questionnaire. This would allow us to consolidate our expectations based on the literature that two major factors would influence corporate performance: the business environment and the strategic decisions undertaken. Secondly, based on the theoretical model expressed by equation 1, we applied a regression analysis procedure to study in detail whether the strategic decisions and the business environment would have an impact on the proxy variables chosen for measuring performance. Finally we built and trained a neural network to forecast performance given the firms' strategic decisions.

We started by defining seven independent variables extracted from the questionnaires and used them as a proxy for the effort and attention given to the strategic vectors identified by Gonçalves and Grigsby [1997]. As the questionnaire was composed by a series of one hundred and six questions, which were constructed on a five-point Likert scale basis, these seven independent summary variables are the result of averaging the corresponding scores of each group of answers (see Gonçalves and Grigsby [1997] and Gonçalves, Palma-dos-Reis and Duque [1999]). These variables will be referred along the text as *score variables* and were defined as:

1. **TA (Technological Adoption)** - includes:

- communication technologies such as electronic mail (within and outside the company), teleconferencing, videoconferencing, wireless communications, telecommuting for teleworking, local and wide area networking and telemarketing;
- decision support systems for individuals and groups, executive information systems, data retrieval systems, expert systems and groupware;

- multimedia for business presentations and marketing, computer assisted instructions for training and development, and electronic document storage and retrieval using images or sound;
- end-user supports including notebook computers, desktop publishing, analytic tools, presentation graphics tools, end-user database access tools;
- systems design and implementation concerning joint application development, non-procedural application development, application prototyping and iterative development, computer-aided software engineering tools.

2. **CS_SA** (Competitive Strategy; Strategic Alliances) - includes acquisitions and controlling major or minor interest in another company, joint ventures with companies in or outside of the industry, licensing arrangements, arrangements to market products or services jointly with another company, joint research and development with another company.

3. **CS_GS** (Competitive Strategy; Geographic Strategies) - includes alternative business expansion strategies based on geographic growth.

4. **CA_S** (Competitive Aspects that a firm Should place on this factor) includes the cost of operations, the volume of business, the market share, the speed of operations, the ability to compete on price, the personalized service, the customer satisfaction, the wide range of products/services, the uniqueness of products/services, the investment in new product development, the technological know-how, the commercial/competitive know-how, the geographic coverage, the market segment coverage and the investment leverage.

5. **CA_A** (Competitive Aspects that a firm Actually places on this factor) - includes the same items referred for CA_S but actually considered by firms as competitive aspects.

6. **BE_P** (Business Environment that at the Present time exists in the sector) - concerns the level of a series of factors that can help to define the business environment, such as the number of firms competing, the degree of concentration, the competitive pressure from domestic firms, the competitive pressure from foreign firms, the Government regulations, the power of customers, the power of suppliers, the substitutes for products/services, the technological change and the existing barriers to entry.

7. **BE_I** (**B**usiness **E**nvironment is actually **I**ncreasing or decreasing in the sector) - checks for the same items mentioned for variable BE_P if they are actually increasing or decreasing.

Then, we selected a number of accounting variables as sources for generating proxies for corporate performance indicators. This methodology was used in other studies with similar concerns such as in Chakravarthy [1986], Mehra [1996] and Banker, Chang and Majumdar [1996]. The accounting variables chosen were Cash Flow, Earnings, Total Assets, Equity Book Value and Total Sales. Although these variables were not directly used to measure the strategic performance of the companies they were used to produce some relative measures (ratios). The accounting variables chosen were presented by Chakravarthy [1986] as *conventional measures of strategic performance* based on a survey of strategic performance measures. According to Woo and Willard (referred by Chakravarthy [1986]), despite some important limitations, these accounting aggregates are important instruments for performance analysis. Krasts [1981] advises that traditional financial statements analysis measuring income based on historical costs is misleading, but the use of cash flows and other non traditional elements can improve performance analysis. As defined by Mehra [1996] accounting ratios can be used to perceive the profitability aspect of strategic performance. We think that this is acceptable and particularly true when average rate or average growth rates are used as a proxy for strategic performance analysis. When large time periods are used, fundamental analysis can be a good approach of market returns, as suggested, among others, by Beaver, Kettler and Scholes [1970]. For a detailed review of the literature on this subject see Elton and Gruber [1995].

Alternatively, market values could be selected, but the limited number of quoted companies in 1995 in the country did not allow. As the performance variables are long term average growth rates extracted from accounting statements and since there is a strong association in the long run between accounting based measures of returns and market based returns (Beaver, Kettler and Scholes [1970]), we restricted the analysis to the accounting measures due to the limited availability of data.

In this study, the variables previously identified were then used to calculate some average rates of profitability, in terms of the equity owners perspective, in terms of the total assets used to generate the income, and in terms of sales generating the returns.

The ratios and rates computed were the following:

1. Average Growth Rate of Earnings per Share (AGREPS)

$$AGREPS_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{EPS_{K,i}}{EPS_{K,i-1}} - 1 \right] \quad i = 1990, \dots, 1994$$

Where $AGREPS_K$ is the average growth rate of earnings per share of firm K and $EPS_{K,i}$ are the earnings per share of firm K on year i;

2. Average Earnings on Equity (AEOE)

$$AEOE_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{EPS_{K,i}}{BVS_{K,i}} \right] \quad i = 1989, 1990, \dots, 1994$$

Where $AEOE_K$ is the Average Earnings on Equity of firm K, $BVS_{K,i}$ is the Book Value per share of firm K on year i;

3. Average Return on Turnover (AROT),

$$AROT_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{E_{K,i}}{T_{K,i}} \right] \quad i = 1989, 1990, \dots, 1994$$

Where $AROT_K$ is the average return on total turnover of firm K, $E_{K,i}$ are the total earnings of firm K in year i and $T_{K,i}$ is the total turnover of firm K in year i.

4. Average Growth Rate of Turnover (AGRT),

$$AGRT_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{T_{K,i}}{T_{K,i-1}} - 1 \right] \quad i = 1990, \dots, 1994$$

Where $AGRT_K$ is the average growth rate of turnover of firm K;

5. Average Return on Assets (AROA)

$$AROA_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{E_{K,i}}{TA_{K,i}} \right] \quad i = 1989, 1990, \dots, 1994$$

Where $AROA_K$ is the average return on assets of firm K and $TA_{K,i}$ are the total assets of firm K in year i;

6. Average Growth Rate of Cash Flow (AGRCF),

$$AGRCF_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{CF_{K,i}}{CF_{K,i-1}} - 1 \right] \quad i = 1990, \dots, 1994$$

Where $AGRCF_K$ is the average growth rate of cash flow of firm K and $CF_{K,i}$ is the total cash flow of firm K in year i;

7. Average Cash Flow on Total Assets (ACFOTA),

$$ACFOTA_K = \frac{1}{N} \sum_{i=1}^N \left[\frac{CF_{K,i}}{TA_{K,i}} \right] \quad i = 1989, 1990, \dots, 1994$$

Where $ACFOTA_K$ is the average cash flow on total assets of firm K and $CF_{K,i}$ is the cash flow of firm K in year i. This group of variables will be referred along the text as *performance variables*.

Principal Component Analysis

Having defined the variables we started by checking, as presented above in the literature review, namely in Kotha and Nair [1995], whether we could spot some major factors among our independent variables for explaining the corporate performance. We used factor analysis selecting Principal Component Analysis as Extraction Method and using Varimax with Kaiser Normalization as Rotation Method.

Linear Regression Analysis

Afterwards, we used regression analysis in order to observe if, according to our expectations based on the literature review, performance was somewhat related with strategic choices undertaken, apart from the firms' business environment. Having selected the *performance variables* as proxies for the economic variables under scope, we hypothesized, as suggested by Nichols, Dwyer and Sann [1996], that economic performance could be the result of the effort given by financial firms to any of the strategic variables selected. As explained earlier, as we used the score variables as a proxy to the execution of strategic decisions, we raised the first hypothesis that performance is related to any of the "score variables".

Hypothesis I

The economic performance is a direct consequence of strategic choices undertaken

This may be tested in a first step by regressing our score variables on the performance variables on a single regression model basis. As we have seven *performance variables* and seven *score variables*, we could develop 49 ways to empirically test hypothesis I. In a practical way, we could develop 49 testable sub-hypothesis each one using a pair of variables (one *performance variable* and one *score variable*). In order to reduce the number of regressions to run we only tested the linear regression equation models for those pairs of variables with significant Pearson's correlation coefficients.

Being Y_j one of the *performance variables*, and X_k one of the score variables, and assuming a linear relation between those variables

$$Y_j = \beta_{0,j,k} + \beta_{1,j,k} X_k + \varepsilon \quad (1)$$

We tested for:

$$H_0: \beta_{1,j,k} = 0$$

$$H_1: \beta_{1,j,k} \neq 0 \quad j,k = \text{Performance variable } j \text{ with strategic variable } k \\ \text{chosen from the set of pairs presented above}$$

Based on the same underlying theoretical framework developed for testing hypothesis I, we tested, in a second stage of the research process, the same economic conceptual dependence but using a multiple regression equation model. Using this model we expect to explain in a better way the economic performance of the companies depending on their undertaken strategic decisions.

In practical terms we assumed that, given a linear relation among performance and score variables, a multiple set of score variables could, in a better way, help to explain the economic performance of the financial industry. The analytical equation used to test our hypothesis was:

$$Y_j = \beta_{0,j} + \beta_{1,j}TA + \beta_{2,j}CS_SA + \beta_{3,j}CS_GS + \\ + \beta_{4,j}CA_S + \beta_{5,j}CA_A + \beta_{6,j}BE_P + \beta_{7,j}BE_I + \varepsilon \quad (2)$$

$$H_0: \beta_{1,j} = \beta_{2,j} = \beta_{3,j} = \beta_{4,j} = \beta_{5,j} = \beta_{6,j} = \beta_{7,j} = 0$$

$$H_1: \beta_{1,j} \neq \beta_{2,j} \neq \beta_{3,j} \neq \beta_{4,j} \neq \beta_{5,j} \neq \beta_{6,j} \neq \beta_{7,j} \neq 0$$

Where:

j = Performance variable chosen from the group presented above

Actually, we allowed in a successive number of tests, for a smaller number of score variables in the model. This means that we do not exclude the hypothesis that a better understanding could be obtained when using a reduced number of variables than when taking all the score variables together.

A second set of hypothesis was raised on the rational that if efforts are put on implementing strategies that are considered vital for corporate performance, than the results are expected to be achieved. Therefore, whenever firms give more importance to the aspects that are sensitive on shareholders wealth, results are expected to be noticed.

Hypothesis II

The economic performance varies with the gap between the importance actually placed on competitive aspects and the importance that should be place on them.

We expect that firms with a degree of importance given to competitive aspects close to the desired level should present better economic performance. As a proxy to this gap we defined two new variables: DIFCA and ADIFCA:

$$DIFCA = CA_S - CA_A \quad (3)$$

$$ADIFCA = |CA_S - CA_A| \quad (4)$$

The variable DIFCA expresses the difference between the importance that is actually placed and the importance that should be given to competitive aspects, while ADIFCA expresses the absolute value of DIFCA. Then we regressed each performance variable on DIFCA and on ADIFCA.

As in the literature tests were performed using national economies and economic sectors, we hypothesized that significant differences could be observed when

comparing the banking industry with the insurance industry. This was carried out by splitting the sample into two different groups: banks and insurance companies. For each group and in separate, we repeated the test for accepting / rejecting Hypothesis I and II.

Neural Network Analysis

Even though the linear analysis offered promising results, we built and trained a neural network to forecast performance, given the firm's strategic decisions. We selected the neural network approach since neural networks are known for modeling nonlinear relationships that other models are unable to capture. Indro et al. [1999] found that artificial neural networks (ANN) generate better forecasting results than linear models for all types of mutual funds; Zhang et al., [1999] found that neural networks are significantly better than logistic regression models in prediction, as well as classification rate estimation. They (Zhang et al., [1999]) also report that neural networks are robust to sampling variations in overall performance classification.

The use of neural networks in financial decision making has been growing rapidly [Zahedi 1996]. According to Enrado [1994] the use of Neural Networks by Mellon Equity Associates provided fairly significant improvements to the security selection process. Wong et al [1992] designed the Intelligent Security Selection (ISS) that included company, industry, economic, and country data.

The neural network, shown in Figure 1, was developed and trained to forecast firm's performance, measured as AROT, AGRT and AROA, based on the nature of the firm, that is, whether the firm is a bank or an insurance company and on the firm's strategic decisions and environment. The firm's strategic decisions and environment included technology adoption (TA), competitive strategies – geographical strategies (CS_GS), competitive aspects – should place (CA_S), competitive aspects – actual (CA_A), business environment – present (BE_P), and business environment – increasing or decreasing (BE_I).

[Figure 1 here]

The neural network consisted of three hetero-associative layers of neurons: The input layer, the hidden layer, and the output layer. Each of the three neurons in the hidden-layer processed the inputs using the sigmoid transfer function, which is:

$$Output(i) = \frac{1}{1 + e^{-Gain.Input(i)}} \quad \text{eq. 4}$$

The network learning followed the Delta learning rule using the backpropagation control strategy. The neural network architecture is summarized in Table 2.

[Table 2 here]

4. Discussion

As explained earlier, we started by exploring our independent variables (score variables) using factor analysis with Principal Component Analysis as Extraction Method and applying Varimax with Kaiser Normalization as Rotation Method.

[Table 3 here]

The results show that two main factor would be sufficient (please refer to Table 3). As we will see from other results where no more than two variables are significant when explaining economic or financial results, we could condense strategic decisions and corresponding environmental variables into a pair of factors without major loss of information. According to the Rotated Component Matrix we would call the first factor “business environment and perspectives” and the second factor “strategic decisions undertaken”. The first factor relates to external variable behaviour and attention that should be given to competitive aspects of the firm. By opposite, the second factor relates to the “strategic decisions undertaken” in terms of technological adoption, strategic alliances, geographic strategies and competitive aspects.

This simplified binomial approach confirms the conclusions of Kotha and Nair [1995] for the Japanese machine tool industry. Therefore we could expect that either business environment or strategic decisions are the major causes for economic and financial performance for the Portuguese financial industry.



Then we studied the Pearson's correlation coefficients for testing possible relations that can occur between variables. The results are presented in Table 4.

[Table 4 here]

As we are primarily concerned with the associations that can occur between score and performance variables, our main attention focus is on the first quadrant of Table 4. It is clear that some relations may exist among variables, particularly between the following pairs:

| | |
|----------------|------------------|
| TA and AEOE | TA and ACFOTA |
| CS_SA and AEOE | CS_GS and AGREPS |
| CS_GS and AROT | CS_GS and ACFOTA |
| BE_P and AEOE | |

This seems to confirm that the adoption of technology, strategic alliances, geographical strategies and the business environment are associated with performance in the Portuguese financial industry.

Then we tested Hypothesis I for the set of pairs shown above. The results are summarized in Table 5. The first conclusion that can be drawn from this table is that some of the relations that seemed to exist do not show a significant linear pattern. At a 5% confidence level we keep only 4 linear models: $AEOE=f(TA)$; $ACFOTA=f(TA)$; $AGRESP=f(CS_GS)$ and $AROT=f(CS_GS)$. Therefore, only TA and CS_GS seem to present a linear relation with some performance variables.

[Table 5 here]

Thirdly, both TA and CS_GS seem to present different and opposed signals with different performance variables. For instance, when TA is regressed with AEOE $\beta_1 > 0$, but when it is regressed with ACFOTA $\beta_1 < 0$. This means that the introduction of information technology pays in terms of return on equity. However, the information technology adoption process seems to follow a pattern of successive investment cash outflows as found by Gonçalves, Palma-dos-Reis and Duque [1999].

Therefore, despite a positive relation between returns (expressed by the average earnings on equity) and the average time period that occurred since the adoption of information technology, we observed a growing need for new investments. It seems plausible that these cash outflows are a necessary way that has to be followed in order to survive in the New Era of the Portuguese financial industry.

It should be stressed that the previous regime of nationalized banks and insurance companies left no room for competition and, therefore, no need for technological renewal. So, when the privatization program started and the competition returned, new investment was needed and a heavy program was initiated causing a long period of negative cash flows. Simultaneously, it seems that these investments became profitable since a positive association was found between returns and the adoption of information technology.

When Geographic Strategies are observed, a similar, and apparently disturbing, conclusion can be drawn. When CS_GS is regressed with AGRESP $\beta_1 < 0$, but when it is regressed with AROT $\beta_1 > 0$. This seems confusing since we find a negative and a simultaneous positive relation of two different performance variables with the same score variable (CS_GS) that reflects the business expansion strategies. However, the growth of CS_GS means an expansion over other territories, implying new investments and new starting costs. This has been reflected either on the decrease of earnings and on the increase of equity capital which has been raised in order to supply the necessary expansions. The need for new cash outflows can also explain the negative β_1 of equation (6) in Table 5 (although not statistically significant at a significant level of 5%). Once again, it seems that positive effects on returns are not associated with positive effects on cash flows. It is reasonable that in a near future these strategies will turn out on a positive series of cash flows.

Secondly, we tested whether the performance variables could be explained by all or some of the score variables using the multiple regression equation, as defined by equation 2. From all equations, we kept those for which the F statistics were significant at a 5% confidence level (see Table 6). The results confirm the findings obtained previously. The average cash flow on total assets is negatively related with

the time period since the introduction of information technology, but is positively related with the competitive marketing aspects actually placed by firms. In terms of profitability, we also confirmed that returns on turnover are positively associated with the importance given to geographic expansion.

[Table 6 here]

Afterwards, we tested whether economic performance is related to the observed gap between the importance actually placed on competitive aspects and the importance that they should place (Hypothesis II). We did not find, in general terms, a significant linear relation among the variables for the entire sample.

Finally, we split the sample into two groups, each one for each industry, and tested for different performance results. Table 7 provides the results for the regression equations that are statistically significant. The results are consistent with the recent development of the Portuguese banking industry. As pointed out previously, the Portuguese banking sector has been under a wave of acquisitions associated with an increased geographical expansion. More retail outlets within Portugal and an expansion to other regions have been a characteristic of the recent development. Therefore, it should be expected that the importance given to competitive strategies either by strategic alliances or by geographical expansion would have a significant impact on some performance variables. We found that the statistically significant impact was produced on the average cash flow on total assets, which is consistent with the results previously presented in a multivariable framework. However, it is interesting to underline that this association is positive, which means that, at least for a while, both the expansion and the alliances process have not been very demanding on operational cash flows. The necessary investment has been a result of increases on equity capital. The continuous public offers for equity subscription⁵ in Lisbon Stock Exchange, along the period under scope, support this hypothesis.

[Table 7 here]

⁵ Forty-four firms were privatised through fifty-three stock exchange sessions for public offerings between 1989 and 1995.

In terms of profitability, the importance given to competitive strategies by strategic alliances is once again related with the performance of banks. As we documented earlier, in a multivariable analysis for the whole industry, these alliances have been successfully reflected on the return on investment ratio.

When the insurance sector was observed, we could not find the same number of significant relations (see Table 8). The only statistically significant association found relates the introduction of information technology and the average return on assets. This is also consistent with the recent development of the Portuguese insurance sector. As it was pointed out previously, this sector has been under a series of acquisitions and tender offers by the banking sector. As a result, when questionnaires are filled by the acquired company's representatives, from their point of view, there are no alliances or geographic expansions. Simultaneously, as documented earlier, the introduction of information technology is a cash outflow process with impact on the profitability of the insurance sector. However, we did not observe this phenomena in the banking industry.

[Table 8 here]

Then we tested whether the approach of the actual importance given to the competitive aspects to the desired level is a plausible explanation for the economic performance. Once again, the results are clearer for the banking industry. Table 9 shows a significantly negative relation between both DIFCA and ADIFCA and a variable that measures economic performance: AGRT. Banks that are actually closer to the desired level of importance given to competitive aspects present better performance indicators expressed by the average growth rate of turnover. These results are not extensible to the insurance industry.

[Table 9 and Table 10 here]

In order to search for possible combined nonlinear patterns, we built and trained a neural network. After 80,000 iterations, the neural network estimates for the firms' performance indicators explained most of the variability of the firms' performance. As shown in Table 11, the r-square for AROT, AGRT and AROA is, respectively,

0.6030, 0.7050 and 0.8099, all of which are approximately 0.10 above the results obtained using the linear regressions.

[Table 11 here]

The neural network training defined the weights that each of the inputs got on the hidden layer, which are shown in Table 12, and the weight each of the hidden layer neurons got on the output neurons, which are shown in Table 13.

[Table 12 and Table 13 here]

In order to evaluate how much each of the input variables may contribute for the performance indicators, we combined the neural network weights on tables 12 and 13 into global input-to-output weights adjusted to a -1 to 1 range. This was possible, without major distortions of the neural network structure, because the output layer neurons do not hold transfer functions and each of the intermediate layer neurons is only connected to two output layer neurons. The raw global weights were computed as:

$$RGW_{ip} = \sum_{h=1..3} w_{i,h} \times w_{h,p} \quad \text{eq. 5}$$

where i stands for the input variable number; h stands for the hidden layer, or intermediate layer, neuron number; p stands for the performance variable number; $w_{i,h}$ stands for the weight the input variable i has on the intermediate neuron h ; $w_{h,p}$ stands for the weight the intermediate neuron h has on the performance variable p ; and $RGW_{i,p}$ stands for the raw global weight the input variable i has on the performance variable p .

In order to provide the reader with more understandable weights, the weights were adjusted to range between -1 and 1. Such adjustment was carried as:

$$GW_{ip} = \frac{\left(RGW_{ip} - \underset{i=1}{\overset{7}{\text{Min}}}(RGW_{ip}) \right) \times 2}{\underset{i=1}{\overset{7}{\text{Max}}}(RGW_{ip}) - \underset{i=1}{\overset{7}{\text{Min}}}(RGW_{ip})} - 1 \quad \text{eq. 6}$$

The global weights, presented in Table 14, suggest that banks are likely to have all three performance indicators better than insurance companies, that TA is only beneficial to AGRT and that firms with geographical strategies (CS_GS) are likely to perform better.

The global network weights also suggest that firms are likely to perform better if they identify more actual competitive aspects (CA_A) and less “should be” competitive aspects (CA_S). In terms of business environment (BE), it seems that, for AROT and AROA, firms that identify less present but more increasing competitive pressure seem to do best, while for AGRT the opposite seems to happen.

5. Conclusions

When reviewing the literature on the impact of strategic choices on corporate performance for developed or centrally planned economies we concluded that there is some theoretical and empirical support for this causal or functional model. We did not expect that in a small economy with a emerging capital market, the conclusions would differ. However, the methodologies under use must be different from some presented in previous papers where market data is available.

We used three different methodologies to test the implications of strategic decisions on corporate performance, in a small opened economy with an emerging capital market. In order to do this we chose the case of the Portuguese financial industry.

Based on a series of questionnaires sent to banks and insurance industries we started by using factor analysis. We concluded, confirming previous studies of Kotha and Nair [1995], that two major factors would explain in large the economic performance of firms: first, the business environment and perspectives, and second, the strategic choices undertaken.

In a deeper analysis we found empirical support for the impact of technology adoption, strategic alliances, geographic strategies as the main components of the

strategic choices undertaken. We also found significant positive impact of the importance given by firms to competitive strategies and the economic performance of financial firms.

However, we found negative impact of both, the adoption of technology and geographic strategies, on firms' cash flows. This is consistent with the findings of Gonçalves, Palma-dos-Reis and Duque [1999] since the adoption process of information technology seems to follow a pattern of successive investment cash outflows. Despite a positive relation between returns and the average time period that occurred since the adoption of information technology, we observed a growing need for new investments. Therefore, it is plausible that these cash outflows are inevitable for the future survival in Portuguese financial industry.

The same negative relations were found when the average growth rate of earnings per share is regressed on geographic strategies. The growth of the importance given to these strategies means an expansion over other territories. This implies that new investments and new starting costs. This has been reflected both on the decreasing of earnings and on the increasing of equity capital which has been raised in order to supply the necessary expansions. Once again, it seems that positive effects on cash flows do not follow positive effects on returns. It is reasonable that, in a near future, these strategies will turn out on a positive series of cash flows.

When multiple regression was tested, the results confirmed the previous conclusions. The average cash flow on total assets is negatively related with the time period since the introduction of information technology, but is positively related with the competitive marketing aspects actually placed by firms. In terms of profitability, we also confirmed that returns on turnover are positively associated with the importance given to geographic expansion.

When the sample was split into banks and insurance companies, we found a positive impact of the importance given to strategic variables on the economic performance of banks, both in terms of cash flows and in terms of returns on investment. Curiously, we found a negative association between the adoption of technology and the average return on assets for insurance companies, but the association vanishes when an outlier



is removed. Therefore the tests done with the sub-sample of insurance companies are not conclusive.

Then we tested whether the approach of the actual importance given to the competitive aspects to the desired level is a plausible explanation for the economic performance. Once again, the results are clearer for the banking industry. Although these results are not extensible to the insurance industry, banks that are actually closer to the desired level of importance given to competitive aspects present better performance indicators.

In summary, using profitability, cash-flows and expenditure measures, we found empirical evidence of the importance given to strategic variables on the economic performance of the Portuguese financial services industry, which is particularly evident in the banking sector.

The use of neural networks allowed us to identify that banks are likely to perform better than insurance companies; that technology adoption is only beneficial to AGRT; and that firms that pursue geographical strategies are likely to perform better than the firms that don't. Firms identifying more actual competitive aspects and less "should be" competitive aspects are also likely to perform better, as well as firms that identify less present but more increasing competitive pressure in the business environment.

As a general conclusion we found business environment and strategic choices two important factors to explain corporate performance. When strategic choices were decomposed into several explanatory sub-variables we found technology adoption, strategic alliances, geographic based strategies and attention focused on competitive aspects as the main contributors. This conclusion is observable either when traditional regression analysis methodology is used either when neural networks were built. Our findings support previous research in more developed economies where studies were carried out with market prices data extracted from efficient capital markets.

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Table 1**Assets and Turnover in 1995**

| | Banks | | Insurance Companies | | Total | |
|-------------------------|----------------------|------|----------------------|------|----------------------|------|
| | 10 ⁹ US\$ | % | 10 ⁹ US\$ | % | 10 ⁹ US\$ | % |
| Total Industry Assets | 263,936 | | 13,989 | | 277,925 | |
| Total Sample Assets | 162,340 | 61.5 | 7,990 | 39,5 | 170,330 | 61.3 |
| Total Industry Turnover | 34,135 | | 4,707 | | 38,841 | |
| Total Sample Turnover | 20,800 | 60.9 | 1,637 | 34.8 | 22,437 | 57.8 |

Table 2**Neural network architecture**

| Issue | Choice |
|---------------------------------------|--------------------|
| Number of input neurons | 7 |
| Number of hidden layer neurons | 3 |
| Number of output neurons | 3 |
| Connection type | Hetero-associative |
| Transfer function on the hidden layer | Sigmoid |
| Learning rule | Delta |
| Control strategy | Backpropagation |

Table 3**Rotated Component Matrix**

| Variable | Component | |
|----------|------------|----------|
| | Factor 1 | Factor 2 |
| BE P | ,905 | -,138 |
| BE I | ,870 | ,222 |
| CA S | ,677 | ,340 |
| CS GS | 7,926E-02 | ,774 |
| TA | ,423 | ,754 |
| CA A | ,155 | ,652 |
| CS SA | -2,977E-02 | ,577 |

Table 4

Correlations

| | | TA | CS_SA | CS_GS | CA_S | CA_A | BE_P | BE_I | AGREPS | AEOE | AROT | AGRT | AROA | AGRCF | ACFOTA |
|--------|---------------------|--------|-------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|-------|--------|
| TA | Pearson Correlation | 1,000 | ,196 | ,603** | ,516** | ,499** | ,239 | ,459** | -,402 | ,534* | -,067 | ,195 | -,187 | ,031 | -,403* |
| | Sig. (1-tailed) | | ,142 | ,000 | ,001 | ,002 | ,094 | ,004 | ,098 | ,025 | ,359 | ,147 | ,153 | ,436 | ,015 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| CS_SA | Pearson Correlation | ,196 | 1,000 | ,260 | ,163 | ,073 | ,016 | ,119 | -,406 | ,470* | ,117 | ,011 | ,165 | ,091 | -,105 |
| | Sig. (1-tailed) | ,142 | | ,079 | ,187 | ,349 | ,465 | ,258 | ,095 | ,045 | ,261 | ,476 | ,184 | ,319 | ,295 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| CS_GS | Pearson Correlation | ,603** | ,260 | 1,000 | ,173 | ,293 | ,036 | ,276 | -,571* | ,011 | ,369* | ,021 | ,237 | -,005 | -,328* |
| | Sig. (1-tailed) | ,000 | ,079 | | ,176 | ,058 | ,423 | ,066 | ,033 | ,486 | ,021 | ,456 | ,100 | ,489 | ,044 |
| | N | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 11 | 13 | 31 | 30 | 31 | 28 | 28 |
| CA_S | Pearson Correlation | ,516** | ,163 | ,173 | 1,000 | ,309* | ,408* | ,500** | -,251 | ,396 | -,221 | -,066 | -,217 | -,174 | -,049 |
| | Sig. (1-tailed) | ,001 | ,187 | ,176 | | ,045 | ,010 | ,002 | ,215 | ,081 | ,112 | ,363 | ,116 | ,183 | ,400 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| CA_A | Pearson Correlation | ,499** | ,073 | ,293 | ,309* | 1,000 | -,005 | ,286 | -,132 | ,228 | -,139 | ,123 | -,245 | ,033 | ,263 |
| | Sig. (1-tailed) | ,002 | ,349 | ,058 | ,045 | | ,490 | ,059 | ,349 | ,227 | ,227 | ,258 | ,092 | ,434 | ,089 |
| | N | 31 | 31 | 30 | 31 | 31 | 31 | 31 | 11 | 13 | 31 | 30 | 31 | 28 | 28 |
| BE_P | Pearson Correlation | ,239 | ,016 | ,036 | ,408* | -,005 | 1,000 | ,666** | -,489 | ,476* | ,113 | ,095 | ,004 | ,024 | -,023 |
| | Sig. (1-tailed) | ,094 | ,465 | ,423 | ,010 | ,490 | | ,000 | ,054 | ,043 | ,269 | ,305 | ,491 | ,452 | ,452 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| BE_I | Pearson Correlation | ,459** | ,119 | ,276 | ,500** | ,286 | ,666** | 1,000 | -,303 | ,443 | ,235 | -,112 | ,151 | ,081 | -,109 |
| | Sig. (1-tailed) | ,004 | ,258 | ,066 | ,002 | ,059 | ,000 | | ,170 | ,056 | ,097 | ,274 | ,204 | ,338 | ,286 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| AGREPS | Pearson Correlation | -,402 | -,406 | -,571* | -,251 | -,132 | -,489 | -,303 | 1,000 | ,071 | -,171 | ,354 | -,150 | ,145 | ,257 |
| | Sig. (1-tailed) | ,098 | ,095 | ,033 | ,215 | ,349 | ,054 | ,170 | | ,413 | ,298 | ,130 | ,320 | ,344 | ,237 |
| | N | 12 | 12 | 11 | 12 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 10 | 10 |
| AEOE | Pearson Correlation | ,534* | ,470* | ,011 | ,396 | ,228 | ,476* | ,443 | ,071 | 1,000 | ,101 | -,210 | ,806** | ,160 | ,316 |
| | Sig. (1-tailed) | ,025 | ,045 | ,486 | ,081 | ,227 | ,043 | ,056 | ,413 | | ,366 | ,246 | ,000 | ,320 | ,172 |
| | N | 14 | 14 | 13 | 14 | 13 | 14 | 14 | 12 | 14 | 14 | 13 | 14 | 11 | 11 |
| AROT | Pearson Correlation | -,067 | ,117 | ,369* | -,221 | -,139 | ,113 | ,235 | -,171 | ,101 | 1,000 | -,546** | ,791** | ,165 | -,074 |
| | Sig. (1-tailed) | ,359 | ,261 | ,021 | ,112 | ,227 | ,269 | ,097 | ,298 | ,366 | | ,001 | ,000 | ,196 | ,351 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| AGRT | Pearson Correlation | ,195 | ,011 | ,021 | -,066 | ,123 | ,095 | -,112 | ,354 | -,210 | -,546** | 1,000 | -,604** | -,121 | -,025 |
| | Sig. (1-tailed) | ,147 | ,476 | ,456 | ,363 | ,258 | ,305 | ,274 | ,130 | ,246 | ,001 | | ,000 | ,265 | ,450 |
| | N | 31 | 31 | 30 | 31 | 30 | 31 | 31 | 12 | 13 | 31 | 31 | 31 | 29 | 29 |
| AROA | Pearson Correlation | -,187 | ,165 | ,237 | -,217 | -,245 | ,004 | ,151 | -,150 | ,806** | ,791** | -,604** | 1,000 | ,173 | ,017 |
| | Sig. (1-tailed) | ,153 | ,184 | ,100 | ,116 | ,092 | ,491 | ,204 | ,320 | ,000 | ,000 | ,000 | | ,184 | ,466 |
| | N | 32 | 32 | 31 | 32 | 31 | 32 | 32 | 12 | 14 | 32 | 31 | 32 | 29 | 29 |
| AGRCF | Pearson Correlation | ,031 | ,091 | -,005 | -,174 | ,033 | ,024 | ,081 | ,145 | ,160 | ,165 | -,121 | ,173 | 1,000 | -,215 |
| | Sig. (1-tailed) | ,436 | ,319 | ,489 | ,183 | ,434 | ,452 | ,338 | ,344 | ,320 | ,196 | ,265 | ,184 | | ,131 |
| | N | 29 | 29 | 28 | 29 | 28 | 29 | 29 | 10 | 11 | 29 | 29 | 29 | 29 | 29 |
| ACFOTA | Pearson Correlation | -,403* | -,105 | -,328* | -,049 | ,263 | -,023 | -,109 | ,257 | ,316 | -,074 | -,025 | ,017 | -,215 | 1,000 |
| | Sig. (1-tailed) | ,015 | ,295 | ,044 | ,400 | ,089 | ,452 | ,286 | ,237 | ,172 | ,351 | ,450 | ,466 | ,131 | |
| | N | 29 | 29 | 28 | 29 | 28 | 29 | 29 | 10 | 11 | 29 | 29 | 29 | 29 | 29 |

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

Table 5

Performance variables as a function of score variables

| Equation | β_0 (t-value) | β_1 (t-value) | Mult. R | Adj. R Squar. | F stat | Sign. F | White's Test χ^2 |
|-----------------------|------------------------|-------------------------|---------|---------------|---------|---------|-----------------------------|
| (1) AEOE = f(TA) | -.047108 (-.850) | .055870* (2.189) | .53427 | .22590 | 4.79369 | .0491 | 4.8977* |
| (2) ACFOTA = f(TA) | .195998* (4.048) | -.063228* (-2.289) | .40310 | .13147 | 5.23833 | .0301 | 3.6331 |
| (3) AEOE = f(CS_SA) | -.045766 (-.715) | .053920 (1.845) | .47007 | .15605 | 3.40374 | .0899 | 1.9664 |
| (4) AGREPS = f(CS_GS) | 81.540246* (2.284) | -23.165342* (-2.088) | .57131 | .25155 | 4.36091 | .0664 | 9.9612* |
| (5) AROT = f(CS_GS) | -.144831 (-1.897) | .059493* (2.138) | .36900 | .10638 | 4.57113 | .0411 | 1.7835 |
| (6) ACFOTA = (CS_GS) | .209377* (3.162) | -.043170 (-1.770) | .32800 | .07326 | 3.13444 | .0884 | 1.5632 |
| (7) AEOE = f(BE_P) | -.360679 (-1.580) | .125560 (1.875) | .47599 | .16211 | 3.51519 | .0853 | 5.9786* |

* - Statistically significant at a significance level of 5%; the critical value for χ^2 is 3.84.



Table 6 Performance variables as a function of multiple score variables

| | Dependent Variables | | | |
|-----------------------|---------------------|---------|-------------|---------|
| | ACFOTA | | AROT | |
| | β | t-value | β | t-value |
| Constant | -.405093 | -1.715 | .152786 | .617 |
| TA | -.116539* | -4.007 | | |
| CS_GS | | | .055405* | 2.009 |
| CA_S | .047850 | .897 | -.178345* | -2.596 |
| CA_A | .138302* | 3.350 | | |
| BE_P | | | -.004186 | .075 |
| BE_I | | | .125313 | 1.587 |
| Mult R | 0.67265 | | 0.57922 | |
| Adj R Squared | 0.38402 | | 0.23326 | |
| F | 6.61082 | | 3.28170 | |
| Signif F | 0.0021 | | 0.0264 | |
| White's Test χ^2 | 5.6224 (a) | | 17.8300 (b) | |

* - Statistically significant at a significance level of 5%; (a) the critical value for χ^2 is 15.51; (b) the critical value for χ^2 is 22.36.

Table 7 Performance variables as a function of multiple score variables Banks

| | Dependent Variables | | | | | |
|-----------------------|---------------------|---------|----------|---------|----------|---------|
| | ACFOTA | | ACFOTA | | AROA | |
| | β | t-value | β | t-value | β | t-value |
| Constant | -.002604 | -.990 | -.008343 | -2.101 | -.004337 | -1.011 |
| CS_SA | .004406* | 3.674 | | | .005653* | 2.888 |
| CS_GS | | | .004399* | 3.704 | | |
| Mult R | .77454 | | .79482 | | .64038 | |
| Adj R Squared | .55545 | | .58570 | | .36093 | |
| F | 13.49468 | | 13.72331 | | 8.34214 | |
| Signif F | .0051 | | .0060 | | .0136 | |
| White's Test χ^2 | 2.8133 | | 2.1961 | | 1.6351 | |

* - Statistically significant at a significance level of 5%; the critical value for χ^2 is 3.84.

Table 8 Performance variables as a function of score variables
Insurance Companies

| | Dependent Variable | |
|---|--------------------|---------|
| | AROA | |
| | β | t-value |
| Constant | .083977 | 1.823 |
| TA | -.084316 | -2.606 |
| Mult R | .54580 | |
| Adj R Squared | .25402 | |
| F | 6.78873 | |
| Signif F | .0191 | |
| White's Test χ^2 | 14.3505* | |

* - Statistically significant at a significance level of 5% the critical value for χ^2 is 3.84.

Table 9 Performance variables as a function of the gap between desired and actual importance given to score variables - Banks

| | Dependent Variable | | | |
|---|--------------------|---------|----------|---------|
| | AGRT | | | |
| | β | t-value | β | t-value |
| Constant | .820669 | .4.650 | .885675 | 4.339 |
| DIFCA | -.549410 | -2.362 | | |
| ADIFCA | | | -.606850 | -2.256 |
| Mult R | .59845 | | .58078 | |
| Adj R Squared | .29395 | | .27103 | |
| F | 5.57969 | | 5.08984 | |
| Signif F | .0398 | | .0477 | |
| White's Test χ^2 | 4.8333* | | 8.8347* | |

- Statistically significant at a significance level of 5%; the critical value for χ^2 is 3.84.

Table 10

Performance variables as a function of the gap between desired and actual importance given to score variables - Insurance Companies

| | Dependent Variable | |
|---|--------------------|---------|
| | AGRCF | |
| | β | t-value |
| Constant | -1.099000 | -2.395 |
| ADIFCA | 1.900355 | 2.807 |
| Mult R | .57439 | |
| Adj R Squared | .28804 | |
| F | 7.87778 | |
| Signif F | .0127 | |
| White's Test χ^2 | 0.5242 | |

* - Statistically significant at a significance level of 5%; the critical value for χ^2 is 3.84.

Table 11

R-squares for the neural network estimates for the financial performance indicators

| | AROT | AGRT | AROA |
|----------|--------|--------|--------|
| R-square | 0,6030 | 0,7050 | 0,8099 |

Table 12

Input weights on the hidden layer neurons

| | BANK / INSUR. | TA | CS_GS | CA_S | CA_A | BE_P | BE_I | ERRO R |
|-------|------------------|---------|--------|---------|---------|---------|---------|-----------|
| W(10) | 0,5614 | 0,8022 | 0,4031 | 0,4622 | 1,1801 | 1,9064 | -1,1716 | -3,1557 |
| W(11) | -1,0304 | -2,2202 | 1,0063 | -0,6906 | 0,1682 | -1,0143 | 2,4973 | 3,1649 |
| W(12) | -0,5561 | -0,5775 | 0,1233 | -0,9763 | -1,3001 | -0,6297 | 0,4781 | -1,4414 |

Table 13**Weights of the hidden layer neurons on the output variables**

| | ERRO | N10 | N11 | N12 |
|-------------|-------------|------------|------------|------------|
| AROT | -0,5369 | 0,1452 | 1,1975 | 0,0000 |
| AGRT | 0,0363 | 1,3999 | 0,0000 | 0,9630 |
| AROA | -0,3579 | 0,0000 | 1,1160 | -0,0489 |

Table 14**Global network weights**

| | BANC | SEG | TA | CS_GS | CA_S | CA_A | BE_P | BE_I |
|--------------------|-------------|------------|-----------|--------------|-------------|-------------|-------------|-------------|
| GlobalWeight(AROT) | -0,4625 | | -1 | 0,629116 | -0,30219 | 0,113942 | -0,43426 | 1 |
| GlobalWeight(AGRT) | -0,23873 | | 0,208385 | 0,257859 | -0,62417 | 0,007687 | 1 | -1 |
| GlobalWeight(AROA) | -0,46088 | | -1 | 0,567417 | -0,29113 | 0,062894 | -0,50822 | 1 |

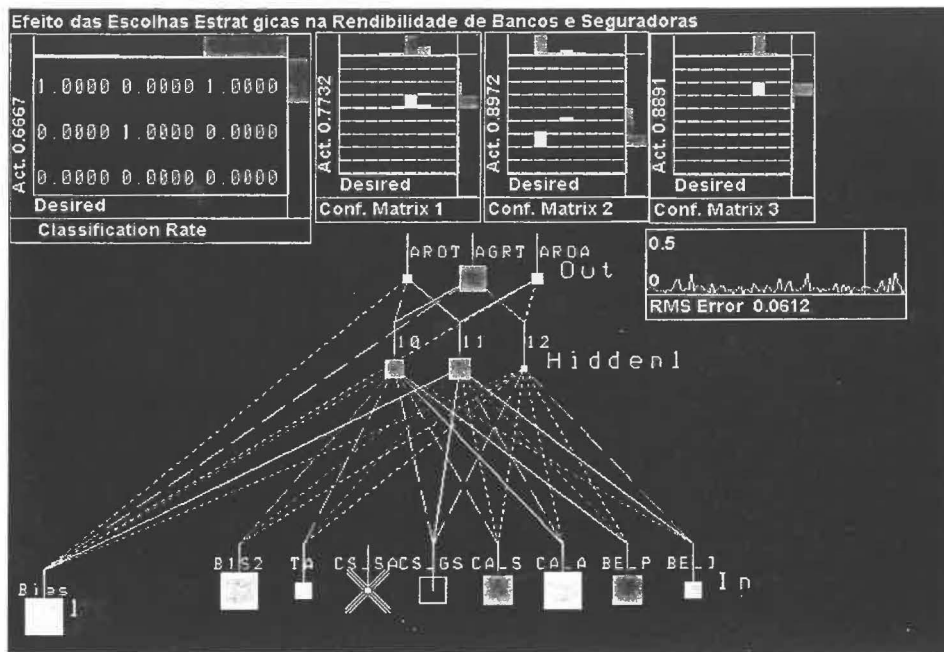


Figure 1 – Neural network to forecast financial firms' performance based on strategic choices

APPENDIX - RESEARCH QUESTIONNAIRE

PART 1 - TECHNOLOGICAL INNOVATION:

For each of the technologies listed below, indicate your company's status as follows:

- 0 = Your company **does not use** this technology, and **has no current plans to adopt it**.
- 1 = Your company does not currently use this technology, but **has plans to adopt it**.
- 2 = Your company has adopted this technology **within the past year**.
- 3 = Your company has used this technology for **1 to 2 years**.
- 4 = Your company has used this technology for **more than 2 years**.

Communications-based technologies:

| | | | | | |
|--|---|---|---|---|---|
| Electronic data interchange (EDI). Direct computer-to-computer exchange of business data, as in purchase orders, invoices, or electronic funds transfer (EFT). | 0 | 1 | 2 | 3 | 4 |
| Teleconferencing | 0 | 1 | 2 | 3 | 4 |
| Videoconferencing | 0 | 1 | 2 | 3 | 4 |
| Electronic mail - within the company | 0 | 1 | 2 | 3 | 4 |
| Electronic mail - outside the company | 0 | 1 | 2 | 3 | 4 |
| Wireless communications (for example cellular telephone systems) | 0 | 1 | 2 | 3 | 4 |
| Telecommuting (working at home or at remote sites by direct link computer) | 0 | 1 | 2 | 3 | 4 |
| Local area networking (LANS) | 0 | 1 | 2 | 3 | 4 |
| Wide area networking (WANS) | 0 | 1 | 2 | 3 | 4 |
| Telemarketing | 0 | 1 | 2 | 3 | 4 |
| Home banking | 0 | 1 | 2 | 3 | 4 |

Decision support and decision making:

| | | | | | |
|---|---|---|---|---|---|
| Decision support systems (for example, IFPS) | 0 | 1 | 2 | 3 | 4 |
| Group decision support systems (GDSS) -- Computer enhanced facilitation of group decision processes | 0 | 1 | 2 | 3 | 4 |
| Executive information systems (EIS). Special data retrieval systems for senior managers | 0 | 1 | 2 | 3 | 4 |
| Groupware (for example, Lotus Notes) | 0 | 1 | 2 | 3 | 4 |
| Expert systems or other artificial intelligence applications | 0 | 1 | 2 | 3 | 4 |

Multimedia:

| | | | | | |
|---|---|---|---|---|---|
| Multimedia for business presentations | 0 | 1 | 2 | 3 | 4 |
| Computer assisted instruction for training and development | 0 | 1 | 2 | 3 | 4 |
| Multimedia for marketing | 0 | 1 | 2 | 3 | 4 |
| Electronic document storage and retrieval using images or sound | 0 | 1 | 2 | 3 | 4 |

End-user support:

| | | | | | |
|---|---|---|---|---|---|
| Notebook computers | 0 | 1 | 2 | 3 | 4 |
| Desktop publishing | 0 | 1 | 2 | 3 | 4 |
| Analytic tools (for example, electronic spreadsheets or statistical packages) | 0 | 1 | 2 | 3 | 4 |
| Presentation graphics tools (Powerpoint, Freelance, Persuasion, Harvard Graphics, etc.) | 0 | 1 | 2 | 3 | 4 |
| End-user database access tools | 0 | 1 | 2 | 3 | 4 |
| Surveys or other assessment of end-user satisfaction | 0 | 1 | 2 | 3 | 4 |

System design and implementation:

| | | | | | |
|---|---|---|---|---|---|
| Joint application development (JAD) | 0 | 1 | 2 | 3 | 4 |
| Non-procedural application development (for example fourth generation languages such as Focus) | 0 | 1 | 2 | 3 | 4 |
| Application prototyping and iterative development (on-line software development using 4GL software such as FOCUS) | 0 | 1 | 2 | 3 | 4 |
| Computer-aided software engineering (CASE) tools | 0 | 1 | 2 | 3 | 4 |
| Process innovation or process reengineering. Complete redesign of the information processing system | 0 | 1 | 2 | 3 | 4 |

PART 2 - COMPETITIVE STRATEGIES

Listed below are a number of competitive strategies that have been used by companies in the financial services industry. For each one, please indicate **HOW IMPORTANT** it has been in your firm's strategy in the **PAST FIVE YEARS**. (1 = not important at all to 5 = very important.)

| <u>A. Strategic Alliances with Other Companies:</u> | Not Important | | | Very Important | |
|---|------------------|---|---|-------------------|---|
| Acquisition of controlling interest in another company | 1 | 2 | 3 | 4 | 5 |
| Acquisition of a minority interest in another company | 1 | 2 | 3 | 4 | 5 |
| Joint venture with another company in your industry. | 1 | 2 | 3 | 4 | 5 |
| Joint venture with a company from outside your industry. | 1 | 2 | 3 | 4 | 5 |
| Licensing arrangements (purchase of rights to use a product or process) | 1 | 2 | 3 | 4 | 5 |
| Arrangements to market products or services jointly with another company. | 1 | 2 | 3 | 4 | 5 |
| Joint research and development with another company | 1 | 2 | 3 | 4 | 5 |
| Other strategic alliances not listed above? (please describe below) | | | | | |
| _____ | 1 | 2 | 3 | 4 | 5 |

| <u>B. Geographic Strategies:</u> | | | | | |
|---|---|---|---|---|---|
| Expansion of business within Portugal | 1 | 2 | 3 | 4 | 5 |
| Expansion of business in other Portuguese -speaking countries | 1 | 2 | 3 | 4 | 5 |
| Expansion of business in Spain | 1 | 2 | 3 | 4 | 5 |
| Expansion of business in other European countries | 1 | 2 | 3 | 4 | 5 |
| Expansion to other regions (please describe below) | | | | | |
| _____ | 1 | 2 | 3 | 4 | 5 |

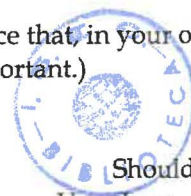
C. Reasons

Please indicate below the **REASONS** for the strategies that you indicated above and their importance:

| <u>Reason:</u> | Not Important | | | Very Important | |
|---|------------------|---|---|-------------------|---|
| To increase scale or size of business | 1 | 2 | 3 | 4 | 5 |
| To increase scope or types of business activities | 1 | 2 | 3 | 4 | 5 |
| To improve service to clients or customers | 1 | 2 | 3 | 4 | 5 |
| Cost reduction | 1 | 2 | 3 | 4 | 5 |
| Access to technical advancements or innovations | 1 | 2 | 3 | 4 | 5 |
| To take advantage of opportunities that arose | 1 | 2 | 3 | 4 | 5 |
| To counter competitor's strategy | 1 | 2 | 3 | 4 | 5 |
| Other reasons (please describe below) | | | | | |
| _____ | 1 | 2 | 3 | 4 | 5 |

PART 3 - COMPETITIVE ASPECTS:

a. For each of the competitive aspects listed below, indicate the degree of importance that, in your opinion, your firm **SHOULD** place on this factor (1 = not important at all, 5 = extremely important.)



| Aspect: | Should Not Be | | | Should Be | |
|--|---------------|---------|---|-----------|-----------|
| | Important | At All: | | Very | Important |
| Low cost of operations. | 1 | 2 | 3 | 4 | 5 |
| Large volume of business. | 1 | 2 | 3 | 4 | 5 |
| Market share. | 1 | 2 | 3 | 4 | 5 |
| Speed of operations. | 1 | 2 | 3 | 4 | 5 |
| Ability to compete on price. | 1 | 2 | 3 | 4 | 5 |
| Personalized service. | 1 | 2 | 3 | 4 | 5 |
| Customer satisfaction. | 1 | 2 | 3 | 4 | 5 |
| Wide range of products/services. | 1 | 2 | 3 | 4 | 5 |
| Uniqueness of products/services. | 1 | 2 | 3 | 4 | 5 |
| Investment in new product development. | 1 | 2 | 3 | 4 | 5 |
| Technological know-how. | 1 | 2 | 3 | 4 | 5 |
| Commercial/competitive know-how. | 1 | 2 | 3 | 4 | 5 |
| Geographic coverage. | 1 | 2 | 3 | 4 | 5 |
| Market segment coverage. | 1 | 2 | 3 | 4 | 5 |
| Investment leverage. | 1 | 2 | 3 | 4 | 5 |
| Other: _____ | 1 | 2 | 3 | 4 | 5 |

b. Now, for each of the same aspects, indicate the degree of importance that, in your opinion, your firm **ACTUALLY** places on this factor (1 = not important at all, 5 = extremely important.)

| Aspect: | Actually Is Not | | | Actually | |
|--|-----------------|--------|---|----------|------|
| | Important | Is Not | | Is | Very |
| Low cost of operations. | 1 | 2 | 3 | 4 | 5 |
| Large volume of business. | 1 | 2 | 3 | 4 | 5 |
| Market share. | 1 | 2 | 3 | 4 | 5 |
| Speed of operations. | 1 | 2 | 3 | 4 | 5 |
| Ability to compete on price. | 1 | 2 | 3 | 4 | 5 |
| Personalized service. | 1 | 2 | 3 | 4 | 5 |
| Customer satisfaction. | 1 | 2 | 3 | 4 | 5 |
| Wide range of products/services. | 1 | 2 | 3 | 4 | 5 |
| Uniqueness of products/services. | 1 | 2 | 3 | 4 | 5 |
| Investment in new product development. | 1 | 2 | 3 | 4 | 5 |
| Technological know-how. | 1 | 2 | 3 | 4 | 5 |
| Commercial/competitive know-how. | 1 | 2 | 3 | 4 | 5 |
| Geographic coverage. | 1 | 2 | 3 | 4 | 5 |
| Market segment coverage. | 1 | 2 | 3 | 4 | 5 |
| Investment leverage. | 1 | 2 | 3 | 4 | 5 |
| Other: _____ | 1 | 2 | 3 | 4 | 5 |

PART 4 - BUSINESS ENVIRONMENT:

a. For each of the environmental aspects listed below, rate the level of the factor as it exists at the present time in your sector of the financial services industry. (1 = very low; 2 = somewhat low; 3 = neutral; 4 = somewhat high; 5 = very high).

| Aspect: | Very Low | | | Very High | |
|---|----------|---|---|-----------|---|
| Number of firms competing. | 1 | 2 | 3 | 4 | 5 |
| Degree of concentration. | 1 | 2 | 3 | 4 | 5 |
| Competitive pressure from domestic firms. | 1 | 2 | 3 | 4 | 5 |
| Competitive pressure from foreign firms. | 1 | 2 | 3 | 4 | 5 |
| Government regulations. | 1 | 2 | 3 | 4 | 5 |
| Power of customers. | 1 | 2 | 3 | 4 | 5 |
| Power of suppliers | 1 | 2 | 3 | 4 | 5 |
| Substitutes for products/services. | 1 | 2 | 3 | 4 | 5 |
| Technological change. | 1 | 2 | 3 | 4 | 5 |
| Barriers to entry. | 1 | 2 | 3 | 4 | 5 |
| Other: _____ | 1 | 2 | 3 | 4 | 5 |

b. Now, for each of the same aspects, please rate the degree to which the aspect is **actually increasing or decreasing**. (1 = definitely decreasing; 2 = decreasing somewhat; 3 = staying the same; 4 = increasing somewhat; 5 = definitely increasing).

| Aspect: | Decreasing | | | Increasing | |
|---|------------|---|---|------------|---|
| Number of firms competing. | 1 | 2 | 3 | 4 | 5 |
| Degree of concentration. | 1 | 2 | 3 | 4 | 5 |
| Competitive pressure from domestic firms. | 1 | 2 | 3 | 4 | 5 |
| Competitive pressure from foreign firms. | 1 | 2 | 3 | 4 | 5 |
| Government regulations. | 1 | 2 | 3 | 4 | 5 |
| Power of customers. | 1 | 2 | 3 | 4 | 5 |
| Power of suppliers | 1 | 2 | 3 | 4 | 5 |
| Substitutes for products/services. | 1 | 2 | 3 | 4 | 5 |
| Technological change. | 1 | 2 | 3 | 4 | 5 |
| Barriers to entry. | 1 | 2 | 3 | 4 | 5 |
| Other: _____ | 1 | 2 | 3 | 4 | 5 |

PART 5 - COMPANY INFORMATION.

In order to interpret the results of the study, we need certain information about your firm. Please answer the questions below as accurately as possible.



1. In which sector (or sectors) of the financial service industry does your company operate? Please check all that apply.

BANKING:

- | | |
|--|---|
| <input type="checkbox"/> Commercial banking | <input type="checkbox"/> Retail banking |
| <input type="checkbox"/> Investment banking | <input type="checkbox"/> Mortgage banking |
| <input type="checkbox"/> Private (trust) banking | |

INSURANCE:

- | | |
|--|---|
| <input type="checkbox"/> Non-life: Health and accident | <input type="checkbox"/> Life: Individual life and retirement plans |
| <input type="checkbox"/> Non-life: Fire, casualty, and liability | <input type="checkbox"/> Life: Group life and pension plans |

Other : _____

2. Personnel:

Indicate the total number of employees in your company during each of the following years:

1989: _____ 1990: _____ 1991: _____ 1992: _____ 1993: _____

At the present time, how many employees specialize in information technology? _____

Does your company have a strategic planning department? _____

If so, how many employees does it contain at this time? _____

3. Technology:

Please estimate the following:

Your company's total investment in information technology _____

Your company's annual expenditures for information technology for the following years:

1989: _____ 1990: _____ 1991: _____ 1992: _____ 1993: _____

4. Research and Development:

For each of the following years, please indicate the total amount spent by your company in all areas of research and development:

1989: _____ 1990: _____ 1991: _____ 1992: _____ 1993: _____



PART 6 - REPUTATION OF COMPETITORS:

Please rank the reputations of companies in your industry (other than your own) on each of the eight dimensions listed, using the scale of 0 = poor to 10 = excellent:

Please note : if you want to rank more than 7 companies, please feel free to copy the next page and attach it to the questionnaire.

| Company _____ | Poor | | | | | | | | | | Excellent | | | | | | | | | | | |
|---------------------------------------|------|---|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|----|
| Quality of management | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Value as a long-term investment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Financial soundness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Use of assets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Quality of products/service | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Innovativeness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ability to attract and keep employees | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Social responsibility | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| Company _____ | Poor | | | | | | | | | | Excellent | | | | | | | | | | | |
|---------------------------------------|------|---|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|----|
| Quality of management | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Value as a long-term investment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Financial soundness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Use of assets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Quality of products/service | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Innovativeness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ability to attract and keep employees | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Social responsibility | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| Company _____ | Poor | | | | | | | | | | Excellent | | | | | | | | | | | |
|---------------------------------------|------|---|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|----|
| Quality of management | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Value as a long-term investment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Financial soundness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Use of assets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Quality of products/service | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Innovativeness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ability to attract and keep employees | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Social responsibility | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| Company _____ | Poor | | | | | | | | | | Excellent | | | | | | | | | | | |
|---------------------------------------|------|---|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|----|
| Quality of management | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Value as a long-term investment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Financial soundness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Use of assets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Quality of products/service | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Innovativeness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ability to attract and keep employees | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Social responsibility | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| Company _____ | Poor | | | | | | | | | | Excellent | | | | | | | | | | | |
|---------------------------------------|------|---|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|---|---|----|
| Quality of management | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Value as a long-term investment | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Financial soundness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Use of assets | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Quality of products/service | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Innovativeness | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ability to attract and keep employees | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Social responsibility | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |