# GROWTH AND PROFITABILITY IN PORTUGUESE COMPANIES: A DYNAMIC PANEL DATA APPROACH

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**Abstract**

In this article, using dynamic panel estimators, we test empirically the relationship between the growth of Portuguese companies and their profitability. The empirical evidence obtained indicates that growth in Portuguese companies means increased profitability. Growth in Portuguese companies is a catalysing factor of profitability, with the motivational effect on employees, given the expectation of greater gains in the future, being more relevant than the possible negative effects of growth on profitability, as a consequence of the need for new more formal labour relations in companies.

**Keywords:** company growth, dynamic estimators, profitability.

**Jel Classifications**: D21, G32, L25

## Introduction

According to Greiner (1972), the relationship between company growth and profitability can be positive or negative. On the one hand, increased growth can contribute to a breakdown of informal relationships established over time in companies, greater growth requiring greater formality in relationships at work, which in the short-term can be difficult to achieve efficiently, this leading to diminished company profitability. On the other hand, greater growth can result in greater profitability, as a result of increased motivation among employees who expect greater gains in the future, gains resulting from greater company size. Greiner (1972) concludes that the effect of company growth on profitability will above all be dependent on the owners' ability to motivate employees. If the positive effect of employee motivation has greater magnitude than the negative effect resulting from the change in the usual working relationships, growth can mean increased company profitability. Otherwise, growth can mean reduced profitability.

Empirical evidence concerning the relationship between growth and profitability is scarce and does not clarify the relationship between the variables. Roper (1999), in the context of Irish companies, and Gschwandtner (2005), for American companies, find statistically insignificant relationships between growth and profitability.

Based on a sample of Portuguese companies, this article contributes to the literature showing evidence of a positive and statistically significant relationship between growth and profitability. Therefore, we can conclude that the employee motivation effect, a

consequence of the possibility for greater gains in the future, can be relevant for companies, so as to overcome the negative effects arising from temporary inefficiency of the new more formal labour relations.

Methodologically, to estimate the relationship between growth and profitability in Portuguese companies, we use dynamic panel estimators, namely the dynamic estimators: 1) GMM (1991); GMM system (1998) and LSDVC (2005). Initially, we only estimate the relationship between growth and profitability. Afterwards, we add other possible explanatory variables of profitability, with the simultaneous objectives of testing robustness of the relationship obtained between growth and profitability and enhancing the analysis made in this study. As other explanatory variables of profitability, we consider: 1) size (Adams and Buckle; 2003; Goddard et al.; 2005); 2) debt (Adams and Buckle, 2003; Goddard et al.; 2005); and 3) liquidity (Adams and Buckle, 2003; Goddard et al., 2005).

Apart from what was stated above, using dynamic panel estimators allows us to determine the level of persistence of profitability, that is to say, it lets us estimate the relationship between profitability in the previous period and profitability in the current period.

In order to attain the objectives of this study, we divide it as follows, after this introduction: 1) section 2 presents the database, the variables and the estimation method used; 2) section 3 presents the results which we go on to discuss; and 4) finally, section 4, presents the conclusion of this study.

## 1. Database, Variables and Estimation Method

### *1.1. Database*

This study uses the database from the Exame journal, the Portuguese branch of Dun & Bradstreet Consultants, concerning the 500 largest Portuguese companies. The companies forming the database are selected annually based on sales volume.

The period of study is the years between 1999 and 2003. Given the use of dynamic estimators as estimation method, we opted for a uniform panel. Choosing a non-uniform panel could lead to the exclusion of companies that were not present for all the years under analysis, preventing correct interpretation of effects over time.

With the aim of considering a uniform panel, we select companies that belong to the database for the total number of years of analysis (1999-2003). Based on this criterion, the panel is made up of 162 companies, with a total of 810 observations.

### *1.2. Variables*

Our central aim is to study the relationship between growth and profitability in Portuguese companies. In addition, with the aims of checking the robustness of the relationship obtained between growth and profitability, and simultaneously enhancing the analysis made, we add other possible determinants of the profitability of Portuguese companies, which serve as control variables. This study considers as control variables: 1) size (Adams and Buckle, 2003; Goddard et al., 2005); 2) debt (Adams and Buckle, 2003; Goddard et al., 2005); and 3) liquidity (Adams and Buckle, 2003; Goddard et al.).

The variables used, together with their corresponding measures are presented in the following table.

**Measurement of variables**

Table 1

| Variables | Measurement |
|---|---|
| *Dependent variables* | |
| Profitability ( $PROF$ ) | Ratio Between Operational Results and Total Assets |
| *Independent variables* | |
| Growth ( $GROW$ ) | Growth of Sales |
| Size ( $SIZE$ ) | Logarithm of Sales |
| Leverage ( $LEV$ ) | Ratio Between Total Liabilities and Total Assets |
| Liquidity ( $LIQ$ ) | Ratio Between Current Assets and Short Term Debt |

### *1.3. Estimation Method*

The advantages of using dynamic estimators mentioned by Arellano and Bond (1991) are: 1) effective control of endogeny; 2) greater control of possible collinearity between the independent variables; 3) control of the effects of possible omission of independent variables in explaining the dependent variable; and 4) elimination of non-observable individual effects.

Use of dynamic estimators allows correct estimation of the relationship between the dependent variable in the previous and current periods. Therefore, in this study we opt to use dynamic panel estimators which, besides the advantages mentioned above by Arellano and Bond (1991), allow correct estimation of the relationship between profitability in the previous period and profitability in the current period, i.e. they allow us to test for the possible persistence of profitability in Portuguese companies, a procedure also used by Goddard et al. (2005), in the context of Belgian, Spanish, French, German and British firms.

Initially, we test the relationship between growth and profitability in Portuguese companies (Regression I). Afterwards, we add the control variables used in this study (Regression II), in order to test robustness of the previously identified relationship between growth and profitability, and simultaneously enhance the analysis carried out. Therefore, we test the following regressions.

Regression I

$$PROF_{i,t} = \beta_0 + \delta PROF_{i,t-1} + \beta_1 GROW_{i,t} + d_t + e_{i,t}; \quad (1)$$

Regression II

$$PROF_{i,t} = \beta_0 + \delta PROF_{i,t-1} + \beta_1 GROW_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 LIQ_{i,t} + d_t + e_{i,t}, \quad (2)$$

in which: $PROF_{i,t}$ is profitability in the current period, $PROF_{i,t-1}$ is profitability in the previous period, $GROW_{i,t}$ is company growth in the current period, $SIZE_{i,t}$ is size in the

current period, $LEV_{i,t}$ is debt in the current period, $LIQ_{i,t}$ is liquidity in the current period, $d_t$ are annual dummy variables measuring the effects of possible macroeconomic alterations on profitability and $e_{i,t}$ is the random error which is assumed to have normal distribution.

Arellano and Bond (1991) propose estimation of equations (1) and (2) in first differences, and use of lags of the dependent and independent variables, at levels, as instruments. This estimator became known as GMM (1991).

However, in cases where we find persistence of the dependent variable, with high correlation between the dependent variable in the current and previous periods, and the number of cross-sections is not particularly high, Blundell and Bond (1998) conclude that the GMM (1991) estimator may not be very efficient, given that the instruments may not be valid. To solve this problem, Blundell and Bond (1998) propose a new estimator, considering a system of variables at levels and in first differences. The dynamic estimator proposed by Blundell and Bond (1998), became known as GMM system (1998). In the equation to estimate, the variables at levels are used as instruments in first differences, and on the contrary when the variables appear transformed in first differences in the equation to estimate, they are used at levels as instruments.

Nevertheless, the results obtained with the GMM (1991) and GMM system (1998) dynamic estimators can only be considered robust on two conditions: 1) validity of the instruments used; 2) non-existence of second order autocorrelation.

With the aim of testing validity of the restrictions, we use the Sargan test, in the case of the GMM (1991) dynamic estimator, and the Hansen test, in the case of the GMM system (1998) dynamic estimator. The null hypothesis is that the instruments are valid, the alternative hypothesis being non-validity of the instruments used. If we reject the null hypothesis, we can conclude that the results obtained are not robust.

This study tests for the existence of first and second order autocorrelation. The null hypothesis is non-existence of autocorrelation, against the alternative hypothesis of existence of autocorrelation. In the case of rejection of the null hypothesis of non-existence of second order autocorrelation, we conclude that the results of the dynamic estimators cannot be considered robust.

Taking advantage of quite recent progress concerning dynamic estimators, we present the results obtained with the LSDVC (Least Squares Dummy Variable Corrected) dynamic estimator, proposed by Bruno (2005). Bruno (2005) concludes that in cases where the number of observations is not very high, using GMM (1991) and GMM system (1998) dynamic estimators, given the high number of instruments generated compared to the number of observations may lead to biased estimates of the parameters. Due to the rather low number of observations in this study, we present the results of the LSDVC (2005) estimator, so as to test robustness of the results obtained with the GMM (1991) and GMM system (1998) dynamic estimators.

## 2. Results and Discussion

### *2.1. Descriptive Statistics*

The following table presents the results of the descriptive statistics referring to the variables used in this study.

**Descriptive Statistics**

Table 2

| *VAR.* | *OBSER.* | *MEAN* | *S.D.* | *MIN.* | *MAX.* |
|---|---|---|---|---|---|
| $PROF_{i,t}$ | 810 | 0.057886 | 0.080004 | -0.23613 | 0.52860 |
| $GROW_{i,t}$ | 810 | 0.182290 | 0.387960 | -0.98103 | 1.94904 |
| $SIZE_{i,t}$ | 810 | 4.794897 | 0.532714 | 3.876771 | 6.76855 |
| $LEV_{i,t}$ | 810 | 0.547047 | 0.213223 | 0.084895 | 1.07437 |
| $LIQ_{i,t}$ | 810 | 1.747994 | 1.281052 | 0.061622 | 11.6462 |

We can see that profitability and growth in Portuguese companies present some volatility, since standard deviations of the variables are above the respective means.

Regarding the remaining variables used in this study: 1) size; 2) debt; and 3) liquidity, volatility is not pronounced, since standard deviations are under the means.

### *2.2. Dynamic Estimators*

Table 3 presents results referring to the relationship between growth and profitability in Portuguese companies (Regression I), without adding control variables. In table 4, we add to the analysis the control variables used in this study (Regression II).

**Dynamic Estimators - Regression I**

Table 3

| Dependent Variable: $PROF_{i,t}$ | | | | |
|---|---|---|---|---|
| Independent Variables | GMM (1991) | GMM System (1998) | LSDVC (2005) Initial (AB) | LSDVC (2005) Initial (BB) |
| $PROF_{i,t-1}$ | 0.653267*** (0.190715) | 0.658744*** (0.08127) | 0.541487*** (0.079407) | 0.596620*** (0.040711) |
| $GROW_{i,t}$ | 0.028255*** (0.00629) | 0.024311*** (0.005582) | 0.021863*** (0.004777) | 0.024825*** (0.004987) |
| *CONS* | 0.003549 (0.002366) | 0.018925*** (0.005119) | | |
| Instruments | GMM | GMM system | | |
| Observations | 486 | 648 | | |
| Sargan ($\chi^2$) | 2.23 | | | |
| Hansen (N(0,1)) | | 28.28 | | |
| m1 (N(0,1)) | -5.60*** | -3.98*** | | |
| m2 (N(0,1)) | 0.73 | 0.35 | | |

**Notes:** 1 Heteroskedasticity consistent and asymptotic robust standard deviations are reported in brackets. 2. Time dummy is included in estimated equations, but not shown. 3. *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.

**Dynamic Estimators - Regression II**

Table 4

| Dependent Variable: $PROF_{i,t}$ | | | | |
|---|---|---|---|---|
| Independent Variables | GMM (1991) | GMM System (1998) | LSDVC (2005) Initial (AB) | LSDVC (2005) Initial (BB) |
| $PROF_{i,t-1}$ | 0.549032*** (0.201164) | 0.588288*** (0.044399) | 0.450818*** (0.064199) | 0.525081*** (0.045155) |
| $GROW_{i,t}$ | 0.030689*** (0.010634) | 0.022959*** (0.005376) | 0.016327*** (0.004605) | 0.01689*** (0.005294) |
| $SIZE_{i,t}$ | 0.037803** (0.010634) | 0.026230*** (0.008979) | 0.057843*** (0.008914) | 0.051697*** (0.008579) |
| $LEV_{i,t}$ | -0.151774*** (0.038909) | -0.057024*** (0.018037) | -0.134678*** (0.022366) | -0.128538*** (0.023408) |
| $LIQ_{i,t}$ | -0.002387 (0.003783) | 0.003461 (0.002426) | -0.002816 (0.002807) | -0.002587 (0.002923) |
| $CONS$ | 0.008098* (0.004499) | -0.078402** (0.036712) | | |
| Instruments | GMM | GMM system | | |
| Observations | 486 | 648 | | |
| Sargan ($\chi^2$) | 5.02 | | | |
| Hansen (N(0,1)) | | 62.32 | | |
| m1 (N(0,1)) | -3.11*** | -3.71*** | | |
| m2 (N(0,1)) | 0.01 | 0.05 | | |

**Notes:** 1 Heteroskedasticity consistent and asymptotic robust standard deviations are reported in brackets. 2. Time dummy is included in estimated equations, but not shown. 3. *** indicates significance at 1% level, ** indicates significance at 5% level, and * indicates significance at 10% level.

Firstly, whether adding control variables (Regression II), or not (Regression I), the results of the Sargan and Hansen tests indicate we cannot reject the null hypothesis of validity of the instruments used, with the GMM (1991) and GMM system (1998) dynamic estimators respectively. Secondly, in no circumstances do we reject the null hypothesis of absence of second order autocorrelation.

Based on the results of the Sargan/Hansen and second order autocorrelation tests, whether adding control variables (Regression II), or not (Regression I), we can consider the results obtained with the GMM (1991) and GMM system (1998) dynamic estimators to be robust.

The results obtained with the LSDVC (2005) estimator, whether considering initial correction of the values obtained with the GMM (1991) estimator or the GMM system (1998) estimator and adding (Regression II), or not (Regression I), control variables, corroborate those obtained when using the GMM (1991) and GMM system (1998) dynamic estimators.

Based on the empirical evidence obtained in this study, we can conclude that:

- whether adding control variables (Regression II) or not (Regression I), the relationship between growth and profitability in Portuguese companies is positive and statistically significant;

- whether adding control variables (Regression II) or not (Regression I), the relationship between profitability in the previous and current periods is positive and statistically significant, and so profitability of Portuguese companies is persistent;
- the relationship between size and profitability in Portuguese companies is positive and statistically significant;
- the relationship between debt and profitability in Portuguese companies is negative and statistically significant;
- the relationship between liquidity and profitability in Portuguese companies is not statistically significant.

### *2.3. Discussion of the Results*

Based on the empirical results obtained in this study, we can conclude that greater growth of Portuguese companies means increased profitability. Therefore, in the context of Portuguese companies, we can conclude that the positive effects of growth on profitability are greater than the negative effects.

Growth in Portuguese companies is a catalysing factor of profitability, the employee motivation effect, due to expected future gains, being more relevant for profitability than the possible negative effects of growth on profitability, arising from the need for new more formal labour relations in companies.

The results obtained show that owners of Portuguese firms will be able to motivate employees appropriately, so that the positive effects of growth on profitability are more relevant than the negative effects, corroborating the conclusions of Greiner (1972).

The positive relationship detected between growth and profitability in Portuguese companies does not corroborate the empirical evidence of previous studies, since Roper (1999), in the context of Irish companies, and Gschwandtner (2005), for American companies, find statistically insignificant relationships between company growth and profitability. While in the context of Irish and American companies, the positive and negative effects of growth on profitability seem to be equally relevant, this does not happen with Portuguese companies where the positive effects of growth on profitability appear to be clearly more relevant than the negative effects.

Concerning the other empirical evidence obtained in this study, we find that profitability is persistent. The values obtained for persistence of profitability vary between 0.450818, estimating regression II with the LSDVC (2005) dynamic estimator correcting the values obtained with the GMM (1991) dynamic estimator, and 0.658744, estimating regression I with the GMM system (1998) dynamic estimator.

Goddard et al. (2005), obtain profitability persistence of 0.4424 for Belgian companies, 0.3378 for French companies, 0.4508 for Italian companies, 0.3752 for Spanish companies, and 0.3375 for British companies.

Persistence of profitability in Portuguese companies is generally above that of companies in other European countries, this result indicating that disturbance arising from companies entering and leaving the market is less relevant in the context of Portuguese companies.

We find a positive and statistically significant relationship between size and profitability in Portuguese companies. Adams and Buckle (2003), in the context of companies in Bermuda,

find a statistically insignificant relationship between size and profitability, and Goddard et al. (2005), obtain negative relationships between size and profitability in Belgian, French, Italian, Spanish and British companies.

The greater possibility of taking advantage of economies of scale and diversification of activities and products, as a consequence of greater size, seems to be more relevant for increased profitability in Portuguese companies than for companies in Bermuda, Belgium, France, Italy, Spain and the United Kingdom. In these countries, there seems to be more relevance of reduced owner control of managers' actions, as a consequence of greater size, compared to what happens in the Portuguese business situation.

The relationship between debt and profitability in Portuguese companies is negative and statistically significant, unlike the case for companies in Bermuda, for which Adams and Buckle (2003) find a positive and statistically significant relationship between debt and profitability, but in agreement with that found for Belgian, French, Italian, Spanish and British companies, for which Goddard et al. (2005) identify a negative and statistically significant relationship between debt and profitability.

Just as in the context of companies in other European countries, recourse to debt seems to be a restrictive factor of profitability in Portuguese companies, possibly due to the need to make periodic payments of the debt charges diminishing the capacity for taking advantage of good opportunities for company growth, opportunities which could mean increased profitability.

The relationship between liquidity and profitability in Portuguese companies is not statistically significant. Adams and Buckle (2003) obtain a negative and statistically significant relationship between liquidity and profitability for firms in Bermuda, while Goddard et al. (2005), in the context of Belgian, French, Italian, Spanish and British companies, find positive relationships between liquidity and profitability.

On one hand, the possible catalysing effect of liquidity on profitability, as a consequence of the greater possibility of meeting short-term commitments, seems not to be sufficiently relevant in the case of Portuguese companies for greater liquidity to mean increased profitability. On the other hand, the possible restrictive effect of liquidity on profitability, as a consequence of managers investing in unprofitable projects also seems insufficiently relevant for greater liquidity in Portuguese companies to mean diminished profitability.

**Conclusion**

In this study, using various dynamic panel estimators, we determine the relationship between growth and profitability in Portuguese companies. Irrespective of the dynamic estimator used, and adding other possible determinants of profitability or not, the empirical evidence obtained indicates that the relationship between Portuguese company growth and profitability is positive and statistically significant.

In the context of Portuguese companies, employees' expectations of greater future gains, as a consequence of greater growth, seem to be particularly relevant for increased profitability. The motivation transmitted by the owners of Portuguese companies in their interaction with employees could also contribute to this state of affairs. It is worth noting particularly that the possible negative effects of company growth on profitability, as a consequence of the need to establish new formal relations in companies, seem not to be sufficiently relevant for

Portuguese company growth to mean diminished profitability, unlike what appears to happen in companies in other European countries.

Concerning the other empirical evidence obtained in this study, we can conclude that: 1) there is considerable persistence of profitability in Portuguese companies; 2) greater size of Portuguese companies means increased profitability; 3) greater recourse to debt by Portuguese companies means diminished profitability; and 4) liquidity appears not to be relevant in explaining the profitability of Portuguese companies.

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