Accounting and Non-Accounting Information on Firms' Profitability: The case of Greece and Cyprus

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Article

Accounting and Non-Accounting Information on Firms' Profitability: The Case of Greece and Cyprus

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Abstract

In this paper, we evaluate the profitability for firms in Greece and Cyprus from 2005 to 2020. More specifically, we investigate the effect of non-accounting variables, which affect the daily life of companies, on the firms' level profitability. We seek to investigate the impact of corruption, unemployment, part-time employment, and R&D on the performance of companies that can help managers by giving them more information and serving them in future decision making. We show that these variables do not have a large effect on the firm-level profitability of these two countries, which is largely influenced by profit margin and other interaction variables, such as profit margin on asset turnover ratio and equity multiplier. Based on the results, we see that companies should put more emphasis on R&D and strengthen the labor market by reducing any negative speculation in the country.

Keywords: profitability; DuPont analysis; corruption; unemployment; part-time employment; R&D

1. Introduction

A large number of economic studies are devoted to the analysis of factors affecting the efficiency (profitability) of enterprises. At the same time, economists identify and investigate various groups of factors affecting profitability (Spitsin et al., 2020).

Estimating the future profitability of a business is an essential step in assessing the intrinsic value of the business. Profitability forecasting is a difficult task, as multiple factors affect business' earnings performance (Artikis et al., 2024). It is a very important topic in accounting and finance research because of the correlation between earnings and stock market performance.

Profitability is the most generalized indicator of the economic efficiency of an entity's activity; it allows you to compare the amount of earnings with the value of the capital, by which it was obtained (Shvachych et al., 2017). It's a fundamental measure of financial success and a key driver of long-term sustainability of it.

The most crucial objective for prosperous businesses in a capitalist economy is profit. Financial metrics have historically been used to assess a manufacturing system's or company's success. These days, stakeholders are growing more worried about their companies' financial performance, especially in the wake of the financial crisis (Mohamed M. Tailab, 2014).

Profitability is more than just generating profits; it is a crucial indicator of a company's health, sustainability, and ability to create value for all stakeholders. Companies must constantly monitor and manage their profitability to ensure long-term success. Having information about a firm's performance enables decision makers to meet potential changes in the economic resources (Camelia Burja, 2011). Companies build strategies differently, according to the firm's resource-based vision (RBV), and due to the differences in their resource and capability mix, they have unique sustainable competitive advantages. (Barney, 1991; Penrose, 1959; Wernerfelt, 1984).

Even though a company's profitability can be determined by financial measurements like sales, expenses, and profit margins, non-accounting factors are also very important in determining long-term financial performance.

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Non-accounting variables may also play an important role on controlling the profitability of firms. Companies that combine innovation, sustainability, employee involvement, and sound corporate governance typically are steady and have long-term success. In our research, we will emphasize the effect of non-accounting metrics on return on equity (ROE, hereafter). Although ROE is a significant indicator, it mostly concentrates on financial information. A more comprehensive view of a company's success can be obtained by considering also non-accounting factors. The long-term profitability and value of a firm can be influenced by a number of factors, including culture, corporate governance, social responsibility, innovation, and employee satisfaction. Moreover, corruption, R&D, unemployment rates and part-time employment can be an significant pillar of firm's growth and certainly its profitability.

The paper is structured as follows; In Section 2 we provide the hypothesis development and research design. Section 3 presents data and methodology. Section 4 presents empirical results. In Section 5 and 6 we provide the concluding remarks.

2. Hypothesis Development and Research Design

2.1. Hypothesis Development

Previous research in the field of non-accounting reporting has indicated a significant development, and the results of this path have attracted the interest of many stakeholders (Turzo et. al, 2022). Non-accounting information can assist the business in enhancing its future financial performance. Hristov et al., 2023 find that there is a significant positive influence of stakeholders' from non-accounting resources on a firm's profitability. Higher importance assigned to non-accounting resources correlates with a higher return on sales.

Non-accounting reporting about of firms, such as those addressing ESG issues, have become increasingly important in recent years. Without taking into account how much emphasis a company has placed on ESG issues, it is impossible to evaluate the current potential for investment and consequently, the value of the IT. (Ali Khan & Obiosa, 2024).

Many studies have taken place around the world examining the implications of internal or external non-accounting variables on firms' profitability such as: corporate governance, corporate social responsibility (CSR) and ESG, innovation and R&D, industry, macroeconomic factors, institutional and legal environment, technological advancement.

Usman and Afandy (2023) examines the relationship between non-accounting information and firm profitability in US-listed companies and find that non-accounting information helps businesses establish credibility with stakeholders and improves their reputation, both of which may result in increased profitability in markets with fierce competition. Pedrini et al., 2023 investigate how stakeholders' non-accounting resources influence a firm's profitability in Spanish companies and identify that they are broken down into key four value drivers, that support different dimensions of a company's performance. These drivers are organizational culture, employees' motivation, organizational Integration, and stakeholders' perception, which are found that both collectively and individually, impact profitability, with a positive sign. Youssef et. al, 2023 explore financial factors (profit margin, working capital management, liquidity, leverage) and non-accounting factors (uncertainty, gross domestic product, inflation) influencing profitability in non-accounting SMEs in the UK. They note the importance of these determinants for managers and stakeholders in ensuring stability and sustainability.

Despite the various studies on the impact of non-accounting variables on the profitability of firms in many countries, research in South-Eastern Europe and more specifically in Greece and Cyprus is scarce. We pay attention to these two countries since so far financial indicators research on profitability in Greece and Cyprus may offer a new viewpoint. Cultural and social dimensions, tourism-driven and service-oriented status of the economy.as well the population of SMEs in these two countries, motivate us to focus on them.

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In addition, firms in these countries have been under pressure to enhance corporate governance and transparency, due to the debt crisis in Greece and the banking failure in Cyprus. A study in these countries, could evaluate if increased profitability has resulted from improved non-accounting information disclosure. In this line, we need to stress, that investment decisions may increasingly being influenced by environmental, social, and governance (ESG) factors (Park et. al, 2021). In Greece and Cyprus, many businesses are adjusting to EU sustainability standards (For firms, adherence to EU non-financial disclosure regulations, such as the CSRD and NFRD Directives, has become crucial. Investor confidence is increased by the transparency and credibility that come from this compliance, which has a favorable effect on their long-term viability as well as their financial performance. This emphasizes the necessity of looking into the direct relationship between compliance strategy and financial performance).

Companies that put sustainability, ethical governance, and employee welfare first are more competitive in global markets. Also, investigation of succeed Greek and Cypriot firms could demonstrate how non-accounting factors affect profitability. By understanding the importance of non-accounting elements, businesses in Greece and Cyprus can attract foreign investment. Moreover, businesses with open corporate governance, moral business conduct, and social responsibility programs are more likely to win over investors. In addition to the above, insights could help policymakers to improve economic stability and regulations. Results may help companies to enhance employee engagement, sustainability, and corporate governance.

We develop hypotheses to understand how and in which level, non-accounting information acting in firms' profitability for both countries. We focus on variables, they may play an important role in sustainability and evolution of businesses. We carry out checks on corruption levels and how they affect the profitability of businesses. Corruption is a pervasive institutional factor of a country that permeates business behavior, influencing corporate misconduct. Moreover, the higher the level of corruption in the country, the smaller the contribution of capitalized development expenditure each year to future profitability (Mazzi et al., 2018). Being a permeable and informal country characteristic, corruption is pervasive in business activities and dealings (Rodriguez, et. al, 2005) with negative consequences. Corruption may recede as firms become more exposed to international rules (Reid, 1983).

Policymakers can develop ways to strengthen institutional frameworks by recognizing the complex link between corruption, corporate profitability, and the function of auditors (Sundarasen et al., 2024). In some contexts, corruption has the ability to generate benefits or opportunities that improve performance momentarily, but in other contexts, it can have negative effects, such as reduced competitiveness, increased legal risk and reputational damage. These impacts would hurt an organization's profitability and competitiveness.

Therefore, we develop our main hypothesis, that corruption has negative effect on profitability.

H1: *Corruption has a negative relationship with profitability.*

We also examine how much business growth in a larger economy is hampered by job loss or the transition from full-time to unemployment and/or part-time employment. We specifically investigate, whether underemployment and/or part-time employment causes a decline in consumer demand, investment capacity, and labor productivity, and hence a reduction in the likelihood of long-term economic growth. We have reservations about the continuing development of science and technology since, in a world that keeps getting more digitalization, companies must adjust and enhance their approach to the new environment. The way that work is organized and performed, the skills that are required to do the work, the employment relationships, the social protection system, the formalization of informal sectors and job quality has significantly been altered (Charles et. al, 2022). One of the biggest factors leading to business bankruptcy in Lithuania is unemployment (Rokas Bekeris, 2012). A high unemployment rate puts pressure on corporate revenues and profitability by lowering the general demand for goods and services (Kroft et. al, 2016). Long-term unemployment lowers the productivity and quality of work produced by available workers, which

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has a detrimental effect on profitability through decreased performance and increased expenditures for training and replacement (Abraham et. al, 2019 & Benigno et. al, 2015). Additionally, part-time plans may result in employees investing less in human capital and being less committed, which over time hinders innovation and earnings (Devicienti et. al, 2018 & Künn-Nelen et. al, 2013). A large percentage of part-time employment without adequate planning might lower total productivity (TFP), particularly in horizontal occupations that require coordination and skill dispersion (Devicienti et. al, 2018). Part-time employment and unemployment have complicated, two-pronged effects on profitability: they can lower expenses, but they can also lower productivity and innovation. The ultimate result is contingent upon industry, management, and framework regulations (Künn-Nelen et al.,2013, Devicienti et al.,2018, Abraham et al.,2019 & Benigno et al., 2015).

Taking the above discussion into consideration, we develop our second hypothesis that unemployment and part – time employment has a negative effect on profitability.

H2: *Unemployment and part- time employment has a negative relationship with profitability.*

AI will not necessarily lead to the skyrocketing unemployment rates that prior literature suggested, because labor markets are already adapting to the new wave of technological change. Workers are responding by changing their occupations or by becoming entrepreneurs (Fossen and Sorgner, 2021). Since R&D expenditure creates new goods and markets, it has a long-term positive correlation with profitability (Khan, M. A., 2023). Additionally, due to product diversification, businesses that continuously spend in R&D are more profitable during difficult times (Sulimany, H. G. H., 2025). Moreover, universities, clusters, and joint ventures working together on R&D improves return on investment, cutting expenses and raising profits (Yang, K. P., 2010). According to Leung, T. Y., 2021, in knowledge-intensive industries, R&D has a beneficial impact on productivity (TFP) and, consequently, profitability. In traditional industries, the impact of R&D is smaller, but it can increase profitability through process improvement (Hsu, S. T., 2020).

In general, R&D has a favorable but ambiguous impact: it increases risk and diversifies results by industry while providing significant long-term profits (Curtis et. al, 2016).

Taking the above discussion into consideration, we develop our third hypothesis that R&D has a positive effect on profitability.

H3: *Research and Development has a positive relationship with profitability.*

2.2. Research Design

We investigate the effect of accounting and non-accounting variables on the profitability of firms in Greece and Cyprus over the period 2005-2020. We are motivated by a desire to conduct our research in these countries since they share similar cultural and social dimensions, tourism-driven and service-oriented status of the economy, and population of SME. At the same time, they have experienced periods of economic crisis, due to a debt crisis in Greece and a banking failure in Cyprus. Our basis will be the examination of ROE through Dupont Analysis. We also add non-accounting variables to claim the existence or not of changes in the profitability of the companies in the two countries, and what effect it had on ROE.

We make the necessary checks if an increase in the corruption variable would have any effect on the companies' ROE. In addition, we show whether the existence of unemployment as well as part-time employment during the periods considered, affect the profitability of the firms. We also assess, whether the research and development costs of the two countries during the period 2005-2020, have a positive, negative or no particular impact on the examined firms in the two countries.

3. Data and Methodology

3.1. Data and Sample Description

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To address the above research questions, we have gathered financial information from 263 firms in both countries. The examined period ranges are from 2005 to 2020. The firm distribution by sector is presented in Table 1.

Table 1. Industry distribution.

Industry	Cyprus	Greece
	Number of firms	
Banks	1	6
Basic Resources	1	17
Chemicals	1	1
Construction & Mats	4	16
Consumer Prod & Svs	1	13
Drug & Grocery Stores	1	6
Energy	4	4
Financial Services	6	4
Food, Bev. and Tobacco	9	19
Health Care		9
Ind. Goods & Services	4	28
Insurance	4	2
Media		6
Real Estate	10	11
Retailers	3	10
Technology	5	15
Telecommunications		5
Travel & Leisure	20	9
Utilities		8
Total	**74**	**189**

We collected data from 74 firms in Cyprus and 189 firms in Greece. These data have been sourced from Datastream.

We have collected the non-accounting variables from, world values surveys, IMF datasheets, Eurostat, World Development Indicators, Bank of Greece, Trading Economics, Transparency International, Hellenic Statistical Authority, Cyprus Statistical Service.

Taking a closer look, we find that the Greek economy is distinguished by a broader and more developed industrial sector, with a much larger representation in the sectors of basic resources, construction, consumer goods, technology, retail, health, media and telecommunications. In contrast, the Cypriot economy appears to be more reliant on the travel and leisure sector, while maintaining a sizeable presence in real estate and financial services. While there are sectors with similar or low activity in both countries, such as banks, pharmaceuticals, chemicals and utilities (in Cyprus), the significant differences in the distribution of companies by sector underline the structural specificities and different growth paths of the two economies.

We computed important DuPont analysis components. With DuPont analysis, we can identify which factors most affect the firm's ROE. The weaknesses and strengths of a business.

Next, we used the DuPont analysis formula to determine ROE. In order to identify the main elements influencing the company's ROE, we lastly examined the data.

In Table 2 we present the descriptive statistics for the sample. The descriptive analysis of the accounting variables shows a negative average for profitability (ROE) and profit margin (PM), which indicates overall profitability challenges in the observed group. Although the turnover rate (ATO)

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presents a moderate average, the considerable standard deviation suggests significant variability in the efficient use of resources. Notably, the high mean and variability of the equity multiplier (EQM) suggest a frequent dependence on financial resources. The near-zero average of the product of margin of equity and turnover (PMxATO) further intensifies concerns about profitability. Regarding the non-accounting variables (CORR, PTE, UNP, RD), both their respective means and standard deviations indicate different levels of central tendency and dispersion. The accounting variables have been winsorised in 1%-99% level to mitigate possible outliers.

Table 2. Descriptive Statistics.

Panel A: Accounting variables (DuPont components)								
Variable	**Total obs.**	**mean**	**min**	**25%**	**50%**	**75%**	**max**	**Std. Dev.**
ROE	3356	-0,01	-0,32	-0,04	0,00	0,03	0,21	0,08
PM	3356	-0,11	-5,24	-0,09	0,01	0,06	1,04	0,69
ATO	3356	0,69	0,01	0,27	0,51	0,84	5,68	0,82
EQM	3356	26,17	0,73	4,03	7,34	16,60	629,26	77,25
PMxATO	3356	0,00	-0,26	-0,03	0,00	0,03	0,24	0,07
Panel B:Non-accounting Variables								
Variable	**Total obs.**	**mean**	**min**	**25%**	**50%**	**75%**	**max**	**Std. Dev.**
CORR	3467	0,47	0,34	0,43	0,46	0,50	0,66	0,09
PTE	3467	0,08	0,04	0,06	0,09	0,10	0,13	0,02
UNP	3467	0,15	0,04	0,09	0,16	0,21	0,28	0,07
RD	3467	0,01	0,00	0,01	0,01	0,01	0,02	0,00

Note: Accounting variables have been winsorised in 1%-99% level. Sample included Greece and Cyprus and covers the period from 2005 to 2020.

3.2. Methodology

3.2.1. Original DuPont Model

$$\mathrm{ROE} = \mathrm{PM} * \mathrm{ATO} * \mathrm{EQM}$$

We decomposed ROE to a forecasting context, similarly to Nissim and Penman (2001), as follows:

$$\mathrm{ROE}_{it+1} = \alpha_0 + \beta_1\,\mathrm{ROE}_{it} + \beta_2\,\mathrm{PM}_{it} + \beta_3\,\mathrm{ATO}_{it} + \beta_4\,(\mathrm{PM}_{it} \times \mathrm{ATO}_{it}) + \beta_5\,\mathrm{EQM}_{it} + \mathrm{u}_{it+1} \quad (1)$$

We extended Eq. (1) by adding four further variables, namely CORR (corruption), RDEXP (gross domestic expenditure on R&D as a percentage of GDP), Part time employment (PTE) and Unemployment (UNP). Therefore, we get the following expression:

$$\mathrm{ROE}_{it+1} = \alpha_0 + \beta_1\mathrm{ROE}_{it} + \beta_2\mathrm{PM}_{it} + \beta_3\mathrm{ATO}_{it} + \beta_4(\mathrm{PM}_{it} \times \mathrm{ATO}_{it}) + \beta_5\mathrm{EQM}_{it} + \beta_6\mathrm{CORR}_{it} + \beta_7\mathrm{RDEXP}_{it} + \beta_8\mathrm{PTE}_{it} + \beta_9\mathrm{UNP}_{it} + \mathrm{u}_{it+1} \quad (2).$$

3.2.2. Estimation Method

To control for unobserved heterogeneity, potential endogeneity of explanatory variables, and dynamic panel bias, we employ the System Generalized Method of Moments (System GMM) estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998).

We estimate the following dynamic panel model:

$$y_{it} = a y_{it-1} + \beta X_{it} + \eta_{it} + u_{it} \quad (3)$$

Where:

- y_{it} is the dependent variable,
- y_{it-1} is the lag of the dependent variable,
- X_{it} the explanatory variables,

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- η_{it} the unobserved firm-specific effects,
- ε_{it} the error term.

And the first-differenced equation is specified as follows:

$$\Delta y_{it} = \Delta a y_{it-1} + \Delta \beta X_{it} + \Delta u_{it} \quad (4)$$

In the GMM calculation of future ROE (2), we treat PM as a fixed variable, even though the DuPont decomposition defines ROE algebraically as the product of PM, ATO, and EQM. In particular, we presume that PM at time t is established before the error term ut+1 is realized, and so meets the orthogonality requirement E[PM t·u t+1]=0. Although the definitional connection between ROE and PM raises a stringent endogeneity worry, we contend that the timing of information flows, in which PM is noticed before ROE realization, permits it to be regarded as exogenous in this situation.

In addition to the use of GMM, we have also estimated the regressions with least squares, separating the data of the two countries for Greece (Table 3 Appendices)) and Cyprus (Table 7 Appendices).

The main regression model is:

$$ROE_{it} = \alpha_0 + \beta_1 PM_{it} + \beta_2 ATO_{it} + \beta_3 (PM_{it} \times ATO_{it}) + \beta_4 EQM_{it} + \beta_5 CORR_{it} + \beta_6 RDEXP_{it} + \beta_7 PTE_{it} + \beta_8 UNP_{it} + u_{it} \quad (5).$$

According to OLS, we made the examinations for all variables and their coefficients. We tested the statistical significance of each variable and presented the effect results on our dependent variable, ROE. We also proceeded with the necessary tests for autocorrelation, heteroskedasticity and multicollinearity and did the further to depict a safe conclusion.

4. Empirical Results

4.1. System GMM Results

What *really* makes a difference to how profitable a company is? It boils down to a couple of key things:

- **Keeping costs down and selling for a good price:** If a company is smart about managing its expenses and can sell its stuff at a decent profit margin, that's a big win for their overall returns. Especially when the economy is a bit tight, being good at this stuff really shines.
- **Making the most of what they've got:** Companies that can generate a lot of sales with the assets they have are doing better. It feels like after the tough times, businesses got leaner and figured out how to be more efficient.

According to Shafiee, M. et. al, 2012 firms should concentrate on their margins and how effectively they are using their resources since that is what drives their earnings. This approach aligns with the principle that understanding and managing margins through efficient resource use is crucial for profitability.

Table 3 allows us to discuss the aforementioned findings as follows. Although we are aware that issues like corruption can cause problems for companies, they don't appear to be a significant factor that directly affects their return on equity (ROE). Perhaps businesses have figured out how to handle it, or perhaps the majority of the organizations in the research are dealing with it at comparable levels.

Table 3. GMM estimation results.

Variable	Coef.	Std. Error	z-Stat	p-Value
L1.ROE	0.0206*	0.0107	1.93	0.054
PM	0.0076***	0.0029	2.61	0.0089
ATO	0.0179***	0.0057	3.16	0.0016
EQM	-0.000004	0.000013	-0.27	0.784
PM × ATO	0.9456***	0.0233	40.60	0.000
CORR	-0.0055	0.0079	-0.69	0.491

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RD	-0.1458	0.1754	-0.83	0.406
PTE	0.0359	0.0305	1.18	0.239
UNP	0.0039	0.0078	0.50	0.617
constant	-0.0136***	0.0034	-4.03	0.0001

Note: : *p < 0.1; **p < 0.05; ***p < 0.01.

The results of the analysis show that both the profit margin (PM) and the asset turnover ratio (ATO) have a positive and statistically significant effect on return on equity (ROE), with p values of 0.009 and 0.002 respectively. This means that the more profitable a firm is and the more efficiently it uses its assets, the higher the return on equity increases. Particularly significant is the interaction between PM and ATO (PMxATO), which is positive and strongly statistically significant (p<0.001), indicating that the combination of profitability and asset utilization efficiency plays a crucial role in improving ROE. In contrast, the financial leverage ratio (EQM) and the variables CORR, RD, PTE and UNP do not show statistically significant effect (p>0.10), while the model constant is negative and statistically significant (p<0.001), which may suggest that, in the absence of the effects of the independent variables, the expected value of ROE is low or negative (Table 3).

The Hansen test for overidentifying restrictions gives us a chi-squared statistic of 123.354 with 106 degrees of freedom and a p-value of 0.119. This p-value is above the typical significance levels, meaning we don't reject the idea that the instruments used in the model are valid – they don't seem to be correlated with the error term, which is a good sign.

Moving on to the Arellano-Bond test for autocorrelation, we see a significant first-order autocorrelation in the differenced residuals (AR(1) p-value = 0.000), which is often expected in GMM estimation. However, the test doesn't find evidence of second-order autocorrelation (AR(2) p-value = 0.625), which is what we it is expected for a well-specified model.

Interestingly, taking on more debt (leverage) doesn't seem to be helping companies make more money right now. Maybe everyone's being a bit cautious with borrowing after the crises, or maybe it's just harder to get loans.

In addition to the above comments, how many people are unemployed in the general economy doesn't seem to directly impact how profitable individual companies are. Maybe companies are somewhat shielded from the ups and downs of the job market, or they've found ways to be flexible with their staffing, like using more part-time workers. However, just using more part-time workers doesn't automatically mean a company will make more money. It could be that these flexible arrangements aren't being used as effectively as they could be.

Finally, it looks like investing in new ideas and research (R&D) isn't showing big profit boosts right away. Maybe these kinds of investments take a while to pay off, or maybe not enough companies are doing it, or the money isn't always going to the right places to see a quick impact on the bottom line. It could also be that only a few companies are really investing heavily in R&D, so we don't see a big effect across all the companies we looked at.

So, the big takeaway here is that to make a good profit these days, especially with how things are, companies really need to be sharp about managing their spending and selling their stuff well. They've got to handle with tough situations. Things we might assume would be big factors, like how much debt they have or the general unemployment rate, don't seem to be directly shaking up their profits right now. Also, Research and Development approaches, they might take a bit of time to actually turn into bigger earnings.

4.2. OLS Results

4.2.1. Greece

Analyzing the Greek companies as a whole, based on the OLS results, we obtain the following results. Our observations are 2,555 and concern 189 firms for the period under consideration, 2005-2020.

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According to general regression statistics for Greece (OLS), the R-squared of 0.961 signals that a whopping 96.1% of the variation in Return on Equity (ROE) is captured by this regression model, pointing to an exceptionally strong fit. The adjusted R-squared, also at 0.961, being virtually identical to the R-squared, suggests that the included independent variables are meaningfully contributing to explaining ROE without causing overfitting. Further bolstering this, the very high F-statistic of 7784.0 with a corresponding p-value of 0.00 strongly indicates that the model as a whole is statistically significant, meaning at least one of the independent variables has a real impact on ROE.

Table 4 includes the coefficients and Significance Test Statistics for Greece during the examined period 2005-2020.

Table 4. OLS Greece, Coefficients and Significance Test Statistics.

Variable	Coefficient	Std. Error (OLS)	t-value	p-value	95% Confidence Interval
const	-0.0010	0.003	-0.285	0.776	(-0.008, 0.006)
PM	0.0053	0.001	9.234	0.000	(0.004, 0.006)
ATO	-0.0002	0.000	-0.455	0.649	(-0.001, 0.001)
EQM	-0.000011	0.000004	-2.690	0.007	(-0.000019, -0.000003)
PMxATO	10.136	0.005	206.76	0.000	(1.004, 1.023)
CORR	-0.0088	0.009	-0.960	0.337	(-0.027, 0.009)
RD	0.0954	0.234	0.407	0.684	(-0.364, 0.555)
PTE	0.0003	0.058	0.005	0.996	(-0.114, 0.115)
UNP	0.0036	0.012	0.314	0.754	(-0.019, 0.026)

The analysis shows that the variable Profit Margin (PM) has a positive and statistically significant effect on ROE, with a coefficient of 0.0053 and $p<0.001$, suggesting that an increase in profitability is directly related to an increase in ROE. The PMxATO interaction term is also highly significant, with a large positive coefficient (1.0136) and a very low p-value ($p<0.001$), revealing a strong synergistic mechanism between profitability and efficient asset utilization. In contrast, the ATO and EQM variables show opposite effects: ATO is not statistically significant ($p=0.649$), while EQM shows a small but statistically significant negative effect ($p=0.007$), suggesting that increased leverage may burden the return on equity. The remaining variables (CORR, RD, PTE, UNP) do not show a statistically significant effect ($p>0.10$), indicating that they are indistinguishable from zero in terms of their contribution to ROE. Finally, the model constant (-0.0010) is not statistically significant ($p=0.776$), with the confidence interval including zero, suggesting that the expected value of ROE in the absence of all variables is negligible.

According to our Diagnostic tests, Durbin-Watson index has a value of 1.783, which is relatively close to 2, indicating that there is no strong first-order autocorrelation problem in the residuals. However, because the value is not exactly 2 and if the data are time series, further testing is required to fully confirm the absence of autocorrelation. The results of the Breusch-Pagan test indicate the existence of heteroskedasticity, which necessitates the use of robust weighted standard errors HC0 to draw more reliable conclusions. Furthermore, according to the Shapiro-Wilk and Jarque-Bera tests, the residuals do not follow the normal distribution. For this reason, confidence intervals via resampling (bootstrapped CI) are used, a method that does not rely on the normality assumption and is considered more realistic when the classical OLS assumptions are violated.

Moreover, strengthening our tests in OLS estimation, Variance Inflation Factors (VIF) assess the level of multicollinearity between the independent variables in the regression model.

These VIF (Variance Inflation Factor) values offer a handy guide for spotting multicollinearity, which is when our independent variables are a bit too "comfortable" with each other. A VIF of 1 is the ideal, showing no correlation at all. If VIFs are between 1 and 5, there's some moderate overlap, but it's likely not a big deal. However, once we creep into the 5 to 10 range, that high correlation might start messing with our coefficient estimates. And if we hit a VIF of 10 or higher, we've got a

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serious multicollinearity situation that could make our coefficient estimates really shaky and untrustworthy.

By zooming on these VIF results, we receive that the constant term comes up in with a hefty VIF of 131.05, but as noted, this is often the case and usually not a red flag for interpreting other coefficients. Profit Margin (PM) at 1.27, Asset Turnover (ATO) at 1.04, and the Equity to Equity Ratio (EQM) at 1.03 all show impressively low correlation with other variables. Their interaction term, PMxATO, also sits at a comfortable 1.41. Corruption (CORR) has a moderate VIF of 2.22, likely not a major worry. Research and Development (RD) nudges towards the higher end at 4.98, suggesting a fairly strong link with another variable. However, Part-Time Employment (PTE) shoots up to a problematic 13.15, signaling serious multicollinearity. Lastly, Unemployment (UNP) at 7.24 also indicates high correlation, potentially causing issues. In short, while most variables seem well-behaved, PTE and UNP are the main culprits raising multicollinearity concerns.

To address heteroskedasticity, we use a corrected version of the standard errors that addresses heteroskedasticity, HC0 (Heteroskedasticity-Consistent) standard errors; when the classical error assumptions are violated (as was done here, according to the Breusch-Pagan test), we use these corrections for more reliable p-values and confidence intervals.

The use of robust standard errors (HC0) enhances the statistical validity of the results, especially in a heteroskedasticity setting. The present analysis shows that only PM and PMxATO variables are reliable and significant predictors of ROE.

The confidence intervals give us a range of values within which we expect the true value of the coefficient for each variable to lie, with 95% probability. The bootstrapping method is an iterative resampling process from the original data, which allows us to estimate the distribution of the coefficients without relying on traditional assumptions (such as normality of the residuals).

The PM and PMxATO variables are clearly significant, since the intervals do not include zero. The remaining variables either have CIs that include 0 or are too wide, indicating low statistical or practical significance. There are variables with CIs so wide (e.g. RD, PTE), indicating that their effect is unstable, perhaps due to multilinearity or heteroskedasticity.

4.2.2. Significance of Variables

The analysis identified the PMxATO variable (profitability and asset return product, according to DuPont analysis) as the dominant determinant of ROE, with a coefficient of 1.0136 (p < 0.001), maintaining high statistical significance and a narrow confidence interval even after bootstrapping (95% CI: 0.9930 - 1.0325).

The Profit Margin (PM) variable also emerged as statistically significant (p = 0.002), with a positive effect on ROE. In contrast, the variables ATO, EQM, CORR, RD, PTE and UNP showed no statistically significant effect, neither with standard error values nor with robust estimates. The overall picture of the model confirms its high explanatory power, but only two variables seem to contribute significantly to the explanation of the return on equity. In particular, PMxATO, which composes the key parts of the DuPont model, confirms its theoretical role as the main determinant of ROE.

Continuing with firms of Cyprus, we present below our OLS Regression Results. Again we present two sets of results, one with “nonrobust” standard errors and the other with “HC0” (White's heteroscedasticity-consistent) standard errors. We'll analyze both to see the differences.

4.2.3. Cyprus

Analyzing the Cyprus companies as a whole, based on the OLS results, we obtain the following results. Our observations are 474 and concern 74 firms for the period under consideration, 2005-2020.

According to OLS results for Cyprus presented, the R-squared is 0.911. This means that the model explains 91.1% of the variance in ROE. In other words, the independent variables together explain very well the changes in ROE of Cypriot companies for the period 2005-2020. The adjusted

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R-squared is very close to the R-squared, suggesting that the addition of independent variables to the model is justified and not simply due to an increase in the number of variables.

Analysis of Coefficients (Coef), Standard Errors (Std Err), t-statistic (t) or z-statistic (z), p-value (P>|t| or P>|z|) and Confidence Intervals ([0.025 0.975]).

The analysis shows remarkable differences between the two models (with and without robust errors). The constant (const) is not statistically significant in both models ($p > 0.05$), indicating that it does not significantly affect ROE when all other variables are zero. Profit Margin (PM) shows a statistically significant positive effect in the model with simple errors ($p = 0.000$), however, this significance disappears in the model with robust HC0 errors ($p = 0.151$), suggesting that the original estimate may have been affected by a violation of OLS assumptions - an important finding. ATO is positive but not statistically significant in both models, although in the HC0 model the p-value (0.055) is marginally close to 0.05, indicating a possible effect that deserves further investigation. EQM has a very small and non-significant coefficient, while the variables CORR, RD, PTE, and UNP remain insignificant in both models. Finally, the PMxATO interaction is positive and highly statistically significant in both models ($p = 0.000$), supporting the idea that the combination of profitability and asset efficiency has a significant and consistent effect on ROE, regardless of the use of simple or robust estimators.

- **Autocorrelation:** The Durbin-Watson Statistic shows at 1.626. Generally, values around 2 suggest that the residuals (the differences between the observed and predicted values) aren't significantly correlated with each other. While 1.626 isn't far away from 2, it does lean towards positive autocorrelation (where consecutive residuals tend to have the same sign). The commentary rightly advises caution, especially when dealing with time series data.

By analyzing the VIF table for Cyprus' firms we get the next results. The constant term has very high VIF, of 335.17, while seemingly alarming, is often a byproduct of how models are structured, especially when interaction terms are involved and variables might be centered. It generally doesn't throw shade on the reliability of the other variables' coefficients. Moving to the individual predictors, Profit Margin (PM) at 1.53 and the interaction term PMxATO at 1.59 show moderate, likely unproblematic, correlations. Asset Turnover (ATO) at a mere 1.05, Equity Multiplier (EQM) at 1.04, and Corruption (CORR) at 1.20 all boast very low VIFs, indicating minimal overlap with other predictors. Research & Development (RD) at 2.18 also falls into a comfortable range of moderate correlation.

On the other hand, unemployment (UNP) at 7.98 and part-time employment (PTE) with a VIF of 9.61 raise concerns. Significant multicollinearity is indicated by these high VIF values, indicating that PTE and UNP have a close relationship with one or more of the other independent variables in the model. Because of this interdependence, it may be challenging to distinguish between PTE and UNP's distinct effects on ROE. In particular, it may cause these variables' coefficient estimates to become unstable and their standard errors to increase, which may make it more difficult to assess their actual statistical significance. It may be necessary to combine the highly correlated variables, be employing other sophisticated regression procedures in order to address this multicollinearity.

Table 5. Coefficients and Statistic Significance, Cyprus 2005-2020.

Variable	Coefficient (nonrobust)	Standard Error (nonrobust)	p-value (nonrobust)	Coefficient (HC0)	Standard Error (HC0)	p-value (HC0)
const	-0.0219	0.023	0.343	-0.0219	0.027	0.415
PM	0.0096	0.002	0.00	0.0096	0.007	0.151
ATO	0.0017	0.002	0.289	0.0017	0.001	0.055
EQM	~0	1.7e−05	0.567	~0	3.22e−05	0.762
PMxATO	0.9731	0.019	0.00	0.9731	0.042	0.00
CORR	0.0204	0.036	0.570	0.0204	0.040	0.614
RD	0.8602	1.507	0.568	0.8602	2.210	0.697
PTE	-0.0892	0.127	0.482	-0.0892	0.140	0.523

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UNP	0.0801	0.085	0.347	0.0801	0.082	0.330

Following our analysis, in accordance with Confidence Intervals we can say that the bootstrapped confidence intervals are generally consistent with the conclusions drawn from the analysis of p-values in the model with robust standard errors (HC0). The PMxATO interaction is the only variable that consistently shows a statistically significant effect on ROE, as its confidence interval does not include zero.

The other independent variables (including PM, ATO, EQM, CORR, RD, PTE, UNP) do not appear to have a statistically significant direct effect on ROE, as their confidence intervals include zero. The borderline case of ATO needs attention.

5. Discussion

5.1. Interpretation of Findings

This research underscores that the profitability of companies in Greece and Cyprus is based primarily on internal economic metrics-primarily profit margins and asset utilization efficiency. Our study using DuPont and regression techniques corroborates that these two variables, particularly their interaction (PMxATO), are powerful and reliable predictors of ROE. On the other hand, external non-accounting factors such as corruption, unemployment, and even R&D intensity did not show statistically significant effects.

This does not imply that non-accounting variables are irrelevant, but that they may be indirect, protracted, or insufficiently reflected in the current data. For example, an investment in R&D may require a longer period of time to be reflected in profitability. Similarly, governance and labor practices may influence other performance metrics before they affect ROE.

5.2. Managerial Implications

Based on the findings, it is critical for businesses to invest in Strategic Focus and Long-Term Vision. Companies need to incorporate non-accounting variables into their strategy with a long-term view. For example, investment in Research and Development (RD) should be considered a strategic choice to create competitive advantage and future profitability, even if it does not have an immediate return.

Also, firms should focus on Creating and Maintaining a Strong Corporate Reputation. A positive reputation, corporate social responsibility and ethical business behaviour can enhance the trust of stakeholders (customers, investors, employees), leading to increased loyalty, better access to talent and capital, and ultimately higher profitability. Companies can invest in CSR initiatives, transparency and communication of their values.

Furthermore, investing in Training and Staff Development is another way for firms to enhance the impact of non-accounting variables on profitability. A well-trained and skilled workforce is vital for innovation, efficiency and product/service quality. Companies need to continuously invest in developing the skills of their employees by creating a continuous learning environment. This can lead to improved productivity and competitiveness, positively impacting profitability in the long term.

In addition, it is a crucial factor for firms to base their business on Uncertainty and Unpredictable Factors, so to reinforce the influence of non-accounting variables on profitability. The ability of a company to deal with unpredictable risks and adapt to a changing environment is critical to maintaining profitability. Companies can invest in risk management systems, flexibility in their operations and developing supply chain resilience.

In a further step, Improving Measurement and Monitoring by firms may strengthen the contribution of non-accounting variables to profitability. Companies need to improve how they measure and monitor non-accounting variables. The use of qualitative and quantitative indicators linked to specific business objectives will allow for a better understanding of their impact on performance.

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Additionally, firms should concentrate on Integration into Integrated Models. In the future, companies could seek to incorporate non-accounting variables into more integrated models for forecasting and managing profitability, taking into account potential time lags and indirect effects.

6. Conclusions

Although non-accounting variables (CORR, RD, PTE, UNP) did not have a direct statistically significant effect on profitability during the period considered for both countries, this does not mean that they are insignificant for the future profitability of Cypriot companies. The non-significance may be due to several reasons, such as time lag and indirect effect. The effect of these variables on profitability may not be immediate, but may occur with a time lag. For example, investments in Research and Development (RD) may not yield immediate profits, but may lead to innovative products and services that will increase profitability in the long run. Also indirect effect plays an important role. Non-accounting variables may affect profitability indirectly, through other factors. For example, a strong corporate reputation (possibly related to CORR) can lead to increased customer and investor confidence, which in turn positively affects sales and access to capital.

It is crucial for Cypriot and Greek firms to recognize their strategic importance for long-term sustainability and profitability even if non-accounting variables had no immediate statistically important affect on profitability during the period under review. Conscious investment and management of these factors can create competitive advantages and lead to better financial performance in the future.

From a practical standpoint, firms in both countries should prioritize operational efficiency and strong cost management strategies. At the same time, regulators and policymakers should aim to improve institutional quality and labor market structures, which might enhance firm profitability over the long run.

Our search includes 263 firms across Greece and Cyprus, which might be a signal that we haven't captured all economy's companies (Greece and Cyprus). Also, non-accounting variables, just like these we studied, may have long term impacts, which are not fully examined in this timeframe. Moreover, we use aggregate proxies (like national R&D expenditure) may not reflect individual investments or strategies at the firm level. Future research could use firms' data for non-accounting factors, instead of each country's as we did in our study. In addition, another suggestion to be studied, is the post- covid period. By using these data since 2021 onwards and search how these factors influenced each country or firm's profitability. Additionally, future researchers can make an approach of cross- country comparisons. Comparison between Greece and Cyprus with other EU members or economies in the Mediterranean can take place, in order to test if these noticed patterns are regionally singular or more global.

Appendix A. Variables Definitions

1. Dependent Value

One financial analysis tool that gives us a thorough grasp of a company's return on equity (ROE) is the DuPont analysis. To get a more comprehensive understanding, we deconstructed ROE into three essential components rather than seeing it as a single figure:

Net profit margin

More precisely, it displays the portion of profit that is left over after all expenses have been subtracted from each euro of sales.

Asset turnover rate

This indicates how well the company makes use of its resources to produce income.

A high ratio shows that the company is using its resources effectively.

Financial Leverage

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This indicator shows us the extent to which the business uses borrowed funds (debt) to finance its operations. High leverage means that the business is using more debt, which can increase ROE, but also increase risk.

With the DuPont analysis, we can identify which factors have the greatest impact on the ROE of the company. The weaknesses and strengths of the business. How the business compares to its competitors. Simply put, DuPont analysis helps us understand "where ROE comes from" and how the business can improve it. Also, how the business compares to its competitors.

First, we calculated the Direct ROE with its constituent variables. As we know ROE is calculated as Net Profit/Equity.

In our case we use time lagged values from the beginning of our analysis. This is as we will include these values in our subsequent tests. Thus, the formula for calculating Return on Equity is differentiated and is as follows: $\mathrm{ROE} = \frac{\mathrm{NETProfit(NETINC)}}{\text{avg Equity } (\mathrm{avg_{TA}})}$, where $\mathrm{avg_{TA}} = \frac{(\mathrm{TA}it + \mathrm{TA}it-1)}{2}$. We calculate Asset Turnover using the average Total Assets as denominator. $\mathrm{ATO} = \frac{\mathrm{NETSAL}}{\mathrm{avg_{TA}}}$.

We did the same for the other variables of interest that we will use in our next measurements.

We created a lag for Net Sales and calculated the average. (Current and previous period).$\mathrm{Avg_{NETSAL}} = \frac{(\mathrm{NETSAL}it + \mathrm{NETSAL}it-1)}{2}$. We calculated Profit Margin using the average Net Sales as denominator.$\mathrm{PM} = \frac{\mathrm{NETINC}}{\mathrm{avg_{NETSAL}}}$.

We created a lag for Cost of Equity and compute its average. $\mathrm{Avg_{CEQ}} = \frac{(\mathrm{CEQ}it + \mathrm{CEQ}it-1)}{2}$. We calculated Equity Multiplier using the average CEQ as denominator. $\mathrm{EQM} = \frac{TA}{\mathrm{avg_{CEQ}}}$.

We introduced an interaction term which will consist of the multiplication of the Profit Margin and the ATO. The PMxATO interaction variable allows us to see how the interaction between profitability and efficiency in asset utilization affects the overall performance of a firm. This allows one to determine whether a simultaneous increase in both PM and ATO has a greater effect on performance (e.g. ROE) than an increase in each factor individually. The inclusion of the interaction variable in prediction models can improve the accuracy of predictions, as it takes into account the combined effect of PM and ATO. PMxATO = PM * ATO.

2. Independent Variables

We introduced the non-economic variables that were used in our regression model and estimate our dependent variable, ROE. The non-economic variables we introduced are 1) corruption levels, 2) the Research & Development sector, 3) the part-time sector, and 4) unemployment.

Corruption: CORR

Research & Development sector: R&D

Part-time sector: PTE

Unemployment: UNP

We used steps to convert the percentage data of these variables into numerical data. Thus, we divided each percentage by 100 and obtain its net value.

CORR=CORR/100

RD=RD/100

PTE=PTE/100

UNP=UNP/100

Variable Definitions

Variable	Measurement
ROE	Return on Equity = Net Profit / Average Equity
PM	Profit Margin = Net Profit / Average Net Sales
ATO	Asset Turnover = Net Sales / Average Total Assets

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EQM	Equity Multiplier = Total Assets / Average Equity
PM × ATO	Interaction term between Profit Margin and Asset Turnover (PM * ATO)
CORR	Corruption Index, scaled between 0 and 1 (Transparency International data)
RD	Research & Development expenditure as a % of GDP (scaled: value / 100)
PTE	Part-Time Employment as a % of total employment (scaled: value / 100)
UNP	National Unemployment Rate (scaled: value / 100)

Appendix B. Diagnostic Tests

1. GMM-Model Diagnostics

Diagnostic Test	Value	p-Value	Interpretation
Hansen Overidentification Test	$\chi^2(106) = 123.35$	0.119	☑ Instruments are valid (no overfitting)
Arellano-Bond AR(1)	z = -3.82	0.000	☑ First-order autocorrelation (expected)
Arellano-Bond AR(2)	z = -0.49	0.625	☑ No second-order autocorrelation — model is valid

2. OLS Greece, General Regression Statistics

Statistical	Value	Interpretation
R-squared	0.961	96.1% of the variance of the dependent variable (ROE) is explained by the model.
Adjusted R-squared	0.961	R^2 adjusted for number of variables and observations.
F-statistic	7784.0	A high value means that the model is statistically significant overall.
Prob (F-statistic)	0.000	Fully statistically significant.
AIC / BIC	{-14230} / {-14180}	Criteria for benchmarking models. Lower values = better model.
Observations	2555	Number of observations
Covariance Type	nonrobust (1o), HC0 (2o)	Variance calculation with and without adjustment for heteroskedasticity.

3. OLS Greece, Diagnostic Tests for the Model

Statistical	Value	Interpretation
Durbin-Watson	1.783	Slightly autocorrelated residuals (close to 2 = ok).

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Breusch-Pagan (Heteroskedasticity)	p = 1.24e-13	There is heteroskedasticity, so we use HC0 in the 2nd model.
Shapiro-Wilk / Jarque-Bera	p < 0.0001	Residuals do not follow a normal distribution.

4. **OLS Greece, Variance Inflation Factors (VIF) - Multilinearity**

Variable	VIF	Interpretation
const	131.05	Very high (perhaps due to scale/intercept)
PM	1.27	Low (ok)
ATO	1.04	Low (ok)
EQM	1.03	Low (ok)
PMxATO	1.41	Low (ok)
CORR	2.22	Moderate
RD	4.98	High (attention)
PTE	13.15	Very high (multilinearity)
UNP	7.24	High (attention)

5. **OLS Greece, Coefficients with Durable (HC0) Standard Errors**

Variable	Robust Std. Error (HC0)
const	0.0032
PM	0.0017
ATO	0.0003
EQM	0.00001
PMxATO	0.0097
CORR	0.0081
RD	0.2280
PTE	0.0590
UNP	0.0109

6. **OLS Greece, Bootstrapped 95% Confidence Interval**

Variable	95% Bootstrapped CI
const	(-0.0073, 0.0058)
PM	(0.0024, 0.0090)
ATO	(-0.0008, 0.0005)
EQM	(≈0, ≈0)
PMxATO	(0.9930, 1.0325)
CORR	(-0.0256, 0.0074)
RD	(-0.3526, 0.5110)
PTE	(-0.1134, 0.1162)
UNP	(-0.0172, 0.0263)

7. **OLS Cyprus, General Regression Statistics**

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Statistical	Value	Interpretation
R-squared	0.911	91.1% of the variance of the dependent variable (ROE) is explained by the model.
Adjusted R-squared	0.910	R^2 adjusted for number of variables and observations. slightly smaller, shows good adaptation.
F-statistic	595.5	A high value means that the model is statistically significant overall. Statistics of the overall model check. Tests whether at least one variable is significant.
Prob (F-statistic)	0.000	Fully statistically significant.
AIC / BIC	{-2054} / {-2016}	Criteria for benchmarking models. Lower values = better model.
Observations	474	Number of observations
Covariance Type	nonrobust (1o), HC0 (2o)	Variance calculation with and without adjustment for heteroskedasticity.

8. OLS Cyprus, Diagnostic Tests for the Model

Statistical	Value	Interpretation
Durbin-Watson	1.626	Slightly autocorrelated residuals (close to 2 = ok).
Breusch-Pagan (Heteroskedasticity)	p = 8.52e-06	There is heteroskedasticity, so we use HC0 in the 2nd model.
Shapiro-Wilk / Jarque-Bera	p < 0.0001	Residuals do not follow a normal distribution.

9. OLS Cyprus, Variance Inflation Factors (VIF) - Multilinearity

Variable	VIF	Interpretation
const	335.17	Very high (perhaps due to scale/intercept)
PM	1.53	Low (ok)
ATO	1.05	Low (ok)
EQM	1.04	Low (ok)
PMxATO	1.59	Low (ok)
CORR	1.20	Low (ok)
RD	2.18	Moderate
PTE	9.61	Very high (multilinearity)
UNP	7.98	High (attention)

10. OLS Cyprus, Bootstrapped 95% Confidence Interval

Variable	95% Bootstrapped CI
const	(-0.0756, 0.0273)
PM	(-0.0016, 0.0231)

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ATO	(-0.0001, 0.0033)
EQM	(-0.0001, 0.0001)
PMxATO	(0.8915, 1.0474)
CORR	(-0.0603, 0.0966)
RD	(-3.9704, 4.7559)
PTE	(-0.3508, 0.2150)
UNP	(-0.0958, 0.2491)

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